

NINTH ANNUAL REPORT
OF THE
NEW YORK WEATHER BUREAU

The Report of the Commissioner of Agriculture, for 1897, consists of three volumes, as follows:

Volume I. Fifth Annual Report of the regular work of the Department of Agriculture, as required by section 5 of chapter 338 of the Laws of 1893.

Volume II. Ninth Annual Report of the State Weather Bureau, and Tenth Annual Report of the Cornell University Agricultural Experiment Station, made to the Commissioner of Agriculture in compliance with the provisions of section 87 of chapter 338 of the Laws of 1893.

Volume III. Sixteenth Annual Report of the New York Agricultural Experiment Station, made to the Commissioner of Agriculture in accordance with the provisions of section 85 of chapter 338 of the Laws of 1893.

TRANSMITTED TO THE LEGISLATURE JANUARY 14, 1898.

WYNKOOP HALLENBECK CRAWFORD CO.,

STATE PRINTERS,

NEW YORK AND ALBANY,

1898.

State of New York—Department of Agriculture.

NINTH ANNUAL REPORT
OF THE
NEW YORK WEATHER BUREAU
1897.

Under the Department of Agriculture and in
Co-operation with the U. S. Weather Bureau.

CREATED AND ORGANIZED UNDER THE LAWS OF THE STATE OF NEW
YORK—(CHAPTER 148, LAWS OF 1889.)

REORGANIZED AND PLACED UNDER THE DEPARTMENT OF AGRICUL
TURE—(CHAPTER 338, LAWS OF 1893.)

CENTRAL OFFICE AT CORNELL UNIVERSITY, ITHACA, N. Y.

LIBRARY
NEW YORK
BOTANICAL
GARDEN

TRANSMITTED TO THE LEGISLATURE JANUARY 14, 1898.

WYNKOOP HALLENBECK CRAWFORD CO.,
STATE PRINTERS,
NEW YORK AND ALBANY.
1898.

7. 11

11 68726

1897

v. 2

STATE OF NEW YORK.

No. 22.

IN ASSEMBLY,

JANUARY 14, 1898.

REPORT OF THE DIRECTOR

OF THE

STATE WEATHER BUREAU.

STATE OF NEW YORK:

DEPARTMENT OF AGRICULTURE,
COMMISSIONER'S OFFICE, *January 14, 1898.* }

HON. JAMES M. E. O'GRADY, *Speaker of the Assembly:*

SIR.—I herewith transmit to the Legislature the Ninth Annual Report of the Director of the State Weather Bureau created by and organized under chapter 148 of the Laws of 1889, and reorganized and placed under the Department of Agriculture (chapter 338, Laws of 1893).

CHARLES A. WIETING,

Commissioner of Agriculture.

LIBRARY
NEW YORK
BOTANICAL
GARDEN

TABLE OF CONTENTS.

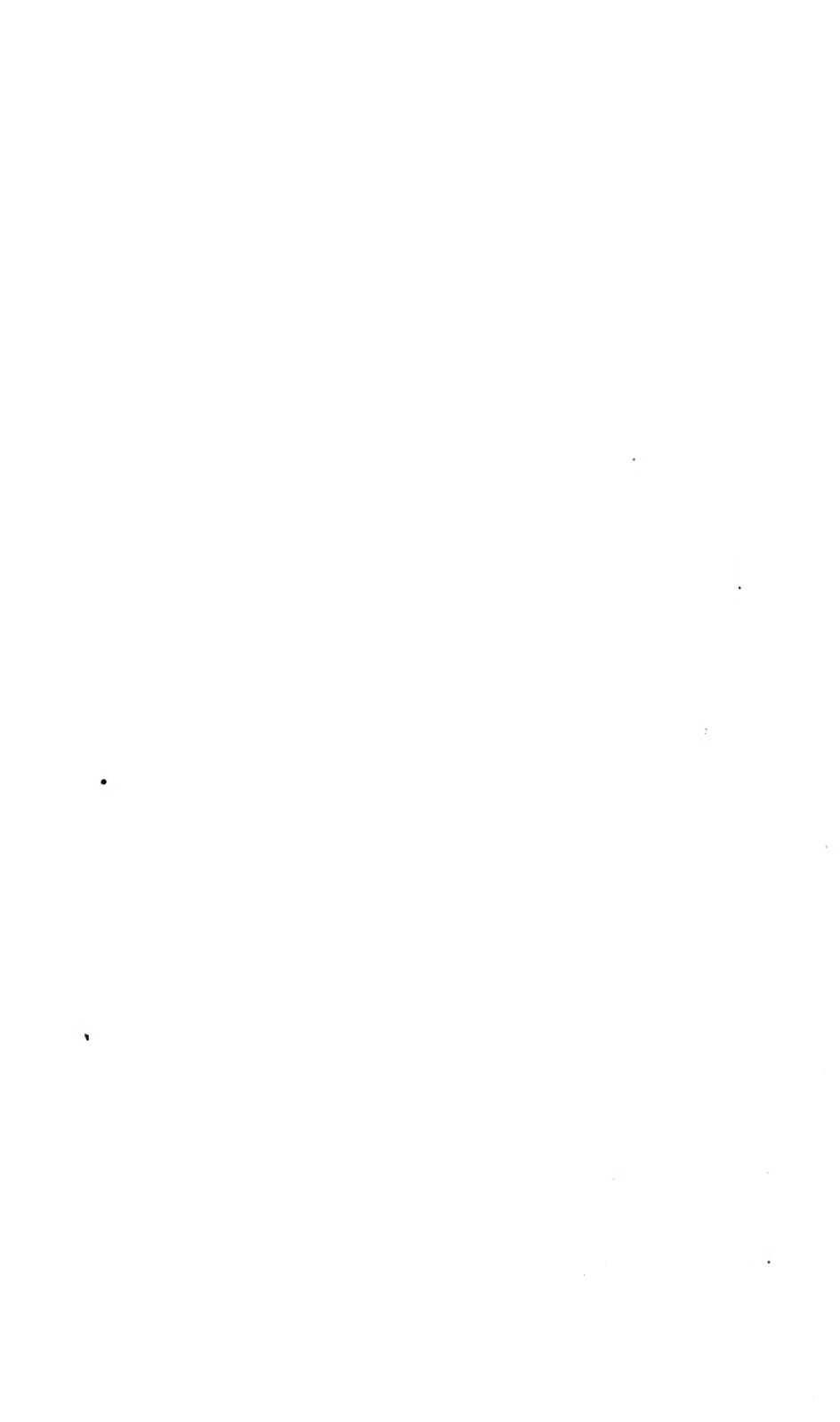
Report of the Director:	PAGE.
Condition and work of the Bureau.....	9
Financial Statement.....	16
Metereological Tables and Summaries for each Month and the Year.....	23
Review of Crop conditions during the year and sample Crop Bulletin.....	357
Statistical Table of Stations.....	376
Description of Stations.....	383

SECTION I.

REPORT OF THE DIRECTOR.

THE CONDITION AND WORK OF THE BUREAU.

FINANCIAL STATEMENT FOR THE FISCAL YEAR 1896-97.



REPORT.

To the Honorable the Commissioner of Agriculture of the State of New York:

SIR:—I have the honor of transmitting to you an account of the work of this Bureau during the year 1897, together with a financial statement for the fiscal year 1896-97.

As a comment upon the facts presented below, it is very gratifying to me to note that, besides the uninterrupted maintenance of its usual routine duties, the Bureau has this year developed a greater efficiency and usefulness than at any previous time since its organization. A marked growth in popular appreciation of the service is shown by a large increase in the number of our voluntary observers, a more general demand for and appreciation of the weather forecasts, and by the increasing frequency of requests for our publications, or for special data, which are received at the central office from a wide variety of sources. Among the latter may be mentioned the large interests now engaged in, or contemplating the production of the sugar beet in this state; an industry whose success depends largely upon specific conditions of temperature, rainfall and sunshine, so that it becomes necessary to learn, through this office, what portions of New York are best suited for its successful cultivation.

Records furnished by this Bureau enter largely into the State Engineer's recent important discussion of water storage in the Hudson and Genesee river systems, in questions under study by the United States Deepwater Ways Commission, and also supply the climatic data used by the State Board of Health in its monthly reports. Each year brings an increasing demand for meteorological

records from city water boards, agricultural experiment stations, agricultural journals, courts of law, physicians, engineers, teachers, and from many other sources which need not be detailed here.

Although the limits of our appropriation necessarily restrict the work of the central office mainly to the routine of maintaining and operating the service throughout the State, substantial progress has been made in the reduction of the complete system of observations which have been carried on at this station since 1879; and it is intended to publish the results of this work at the close of the twenty years' period 1879-1898. The laws of rainfall in this State are also being systematically investigated, and the results thus far attained will be found in the course of this report.

The experimental work contemplated in the act creating the Bureau has not been neglected, as will be noted on a subsequent page. And in this connection, I wish to make special mention of the new hydraulic laboratory of the College of Civil Engineering of Cornell University, the most elaborate and extensive one in the world, and which is now nearing completion. It provides means for accurately gauging the flow of Fall Creek, whose water-shed of 117 square miles is to be topographically surveyed during the coming spring. An admirable opportunity will thus be afforded for determining the relation of rainfall to stream-flow, the rates of percolation and evaporation and many other subjects of great practical importance. It may, however, be desirable to state that the work of this Bureau is in no way related to Cornell University. This false impression exists in some quarters, and is prejudicial to the interests, at least, of the Bureau. The connecting link of both institutions lies in the slender fact that the University furnishes, free of charge, the quarters of the Bureau, and as a seat of learning lends itself admirably to our purposes, owing to the access the officers have to its equipments, advice, and peculiarly advantageous conditions here presented for meteorological study.

It must not be forgotten that the success of our work rests primarily upon the fidelity of a large corps of observers and correspondents who receive no pay for their labors. The motives of public spirit and scientific interest thus manifested by so many persons will be gratefully acknowledged by every one who profits by the valuable data thus freely secured to the State, and this is indeed an incontrovertible proof of the intelligence and public spirit of our people. In no country of Europe such an experiment could have succeeded, nor would it have been feasible to undertake it. We have in this state an army of persons willing to give time, thought and labor — freely and faithfully — without other reward than the consciousness of contributing to the general welfare of our people,

Meteorological Stations. — One hundred and three stations, representing fifty-four counties, are now equipped for observing both temperature and rainfall; an increase of sixteen stations over the number in operation at this date in 1897. Eighteen new stations have been established during the year, as follows (in order of date of equipment):—

Garrattsville,	Otsego county,	Mr. F. J. Campbell, observer.
Elizabethtown,	Essex county,	Mr. M. B. Davis, observer.
Watkins,	Schuyler county,	Dr. I. W. Brewer, observer.
Ticonderoga,	Essex county,	Mr. D. M. Arnold, C. E., observer.
Bouckville,	Madison county,	Mr. L. W. Griswold, observer.
Penn Yan,	Yates county,	Mr. R. L. Eastman, observer.
Lake Placid,	Essex county,	Messrs. J. A. & G. A. Stevens, observers.
Cedar Hill,	Albany county,	Messrs. Schoonmaker and Son, observers.
Auburn.	Cayuga county,	Mr. A. H. Underwood, observer.
Alexandria Bay,	Jefferson county,	Mr. Geo. D. Miller, observer.
Nunda,	Livingston county,	Prof. J. P. Slocum, observer.
Greenwich,	Washington county,	Mr. Oscar W. Teft, observer.
Fayetteville,	Onondaga county,	Mr. E. L. Parker, observer.
Napoli,	Cattaraugus county,	Mr. Geo. A. Gladden, observer.
Liberty,	Sullivan county,	Dr. J. E. Stubbett, observer.
Keene Valley,	Essex county,	Rev. C. M. Perry, observer.
Alden,	Erie county,	Mr. J. W. Evans, observer.
Schenectady,	Schenectady county,	Prof. Arthur Marion, observer.

Observations have been discontinued, and instruments returned from two regular stations, as follows:— Lebanon Springs, Columbia county, and Massena, St. Lawrence county. Mr. F. J. Campbell, formerly in charge of the station Bloomville, continues observations at Garrattsville.

Twenty-eight special rainfall stations (equipped with rain-gauges only) are now in operation, in addition to the regular stations. Two have been established during the year, namely :

Lyndonville,	Orleans county,	Mr. F. Plummer, observer.
Schenevus,	Otsego county,	Mr. C. J. Tipple, observer.

The rainfall stations Demster, Oswego county and Tyrone, Schuyler county, have been discontinued. I note with regret the death of Mr. F. W. Squires of Demster, whose observations upon rainfall had been carried on for many years.

All stations observing temperature are provided with self-recording thermometers giving the highest and lowest readings during the 24 hours preceding the observations, which are taken soon after sundown each day. The mean of the highest and lowest readings does not differ materially from the average value for the 24 hours. More than 30 stations are provided with thermometers of the ordinary pattern, but suitably standardized, which are read three times daily (at 7 a. m., 2 p. m. and 9 p. m.) and thereby a very close approximation to the true daily mean is obtained.

In the establishment of meteorological stations, especial care is taken to secure their uniform distribution over the State, as far as possible; but this has been difficult to accomplish in the thinly populated highland districts of northern and southeastern New York. It is satisfactory to record that this year persistent efforts have resulted in securing to the bureau three observers in the northern sections, while the new station at Liberty, Sullivan county, will furnish valuable data from the mountainous sections west of the Hudson.

The System of Weather Forecast Distribution, under supervision of the Central Office, now embraces 806 cities and villages in this State, representing an increase of 77 during the year. The forecasts are transmitted from Washington to 106 stations, and 46 of this number serve as distributing centers at which copies of the messages are made by means of a "logotype" or rubber stamping device, and immediately forwarded by mail to adjacent villages. Over 200,000 cards and letters (franked by the government) are addressed and mailed from this office annually, while the proper maintenance of the display stations requires constant supervision and correspondence.

The "logotype" system of distribution continues to grow in favor, and, since the expense involved is slight, continued efforts will be made to extend its benefits throughout the State.

A Weather Crop Bulletin was published on Tuesday of each week during the farming season, or from April 28th to October 2nd, inclusive. Information detailing the effect of current weather upon crop conditions was furnished for this publication by 80 correspondents, located in 43 counties, and representing all of the staple grain, vegetable and fruit products of the State. A specimen copy is appended to this report. The bulletin is in constant demand by grain and stock exchanges and Chambers of Commerce throughout the United States.

The mailing list of the bulletin, numbering more than 770 addresses, shows a considerable increase over that of 1896; and since additions to the list are made only upon application, the public appreciation of the bulletin is sufficiently manifest. More or less complete extracts from the crop summary appear in about one hundred newspapers, and are especially welcomed by journals circulating largely among farmers.

The benefits to be derived from the crop-bulletin have never been more apparent than during this season, when a financial crisis and the remarkable diversity of weather, and hence the crop conditions, in various regions of the State and country, rendered it of especial importance that the farmer should be kept in touch with agricultural prospects beyond his own immediate range of observation.

Special work at the Central Office.—The collation, in tabular form, of the observations carried on at the Central Station during the past 19 years, has been recently undertaken. The table of daily temperatures is now completed, but in accordance with meteorological usage, its publication will be withheld until the completion of the 20 years period 1879–1898. The rainfall and other elements will be similarly treated, and will form the basis of a thorough descriptive study of the climate of Ithaca, which it is hoped may appear in the report for the coming year.

A very comprehensive collection of rainfall records for the State at large is deposited at this office, and this data is now being systematically studied. The first paper, relating to secular or long-range fluctuations of rainfall, is nearly ready for publication.

Modifications in the design of instruments in use at this station have been designed by the director and meteorologist, and the work has been executed by a mechanician temporarily employed for the purpose. The cinemograph, an instrument showing in detail the velocity of the wind during gusts, has required many changes, and is now much better fitted for its purposes than when purchased from the makers. Much consideration has also been given to the design of a new sunshine recorder, since none of those now in use are at all adequate to the needs of agricultural investigation.

The staff of the Central Office comprises, as heretofore, a meteorologist, secretary and an assistant, detailed to this service by the United States Weather bureau. Additional temporary aid has been occasionally employed when the pressure of routine work required.

E. A. FUERTES.

NEW YORK STATE WEATHER BUREAU—FINANCIAL STATEMENT FOR THE FISCAL
YEAR 1896-97.

Date.	Order number.	To whom issued.	For what purpose.	Amount.	Total.
1896.					
October	3	George Small	Twenty packing boxes	\$7 00	.....
	20	Philadelphia Photo-Engraving Co	Record forms	53 50	.....
	27	C. D. Cass	Labor, constructing instruments	21 00	.....
	28	Standard Underground Cable Co.	Six hundred and twenty-five feet ten-wire cable		.....
November	4	E. T. Turner	Services for October	37 50	.....
	4	W. O. Kerr	Services and expenses, October.	100 00	.....
	4	Andrus & Church	One thousand letter-heads	109 90	.....
	6	Gregory & Apgar	Printing August report	5 25	.....
	10	Philadelphia Photo-Engraving Co	September charts	65 10	.....
	27	George Small	Material and labor	28 50	.....
	27	C. D. Cass	Labor, on instruments.	7 35	.....
	30	John Hennessy	Labor, laying cable	37 50	.....
December	1	Wm. E. Mott	Services as computer	23 67	.....
	1	E. T. Turner	Services and expenses, November	44 00	.....
	1	W. O. Kerr	Services and expenses, November	101 20	.....
	10	Gregory & Apgar	Printing September report	109 67	.....
	10	Philadelphia Photo-Engraving Co.	October charts	65 10	.....
	12	C. J. Rumsey & Co.	Battery supplies	28 50	.....
	22	Wm. E. Mott	Services as computer	48 15	.....
	23	New York & Pennsylvania Tel. & Tel. Co.	Telephone, quarter ending December 31	28 00	.....
	28	Priest & Benjamin	Printing record forms	13 50	.....
	31	E. T. Turner	Services for December	2 50	.....
	31	W. O. Kerr	Services and expenses, December	100 00	.....
1897.				111 59	.....
January	2	Andrus & Church	Office supplies	2 39	.....
	8	Gregory & Apgar	Printing October report	65 10	.....

February	12	Philadelphia Photo-Engraving Co.....	November charts.....	28 50
	3	E. T. Turner.....	Services for January.....	100 00
	3	E. A. Fuertes.....	Expenses to Albany.....	17 98
	3	W. O. Kerr.....	Services and expenses, January.....	107 05
	9	Gregory & Apgar.....	Printing November report.....	65 10
March	15	New York & Pennsylvania Tel. & Tel. Co.....	Telephone, quarter ending March 31.....	13 50
	25	Andrus & Church.....	Office supplies.....	1 15
	5	Wm. E. Mott.....	Services as computer.....	64 00
	5	E. T. Turner.....	Services for February.....	100 00
	5	W. O. Kerr.....	Services and expenses, February.....	116 02
April	11	Philadelphia Photo-Engraving Co.....	December and annual charts.....	80 04
	19	Philadelphia Photo-Engraving Co.....	January charts and revised base.....	31 50
	3	John T. Parson.....	Drawings, December and annual charts.....	12 50
	3	Wm. E. Mott.....	Services as computer.....	44 00
	5	E. T. Turner.....	Services for March.....	100 00
May	5	W. O. Kerr.....	Services and expenses, March.....	117 13
	9	Philadelphia Photo-Engraving Co.....	February charts.....	28 50
	13	Gregory & Apgar.....	Printing December and Annual Supplement.....	109 88
	21	Andrus & Church.....	One thousand letter heads.....	5 25
	22	Gregory & Apgar.....	Printing January report.....	65 10
June	28	Philadelphia Photo-Engraving Co.....	March charts.....	28 50
	3	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 1.....	8 25
	3	Wm. E. Mott.....	Services as computer.....	36 00
	3	E. T. Turner.....	Services for April.....	100 00
	4	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 2.....	8 25
	4	W. O. Kerr.....	Services and expenses, April.....	111 13
	8	E. A. Fuertes.....	Expenses to Albany.....	19 13
	11	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 3.....	8 25
	15	Priest & Benjamin.....	Printing mailing list.....	11 50
	17	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 4.....	8 25
	25	Gregory & Apgar.....	Printing February report.....	65 10
	25	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 5.....	8 25
	28	New York & Pennsylvania Tel. & Tel. Co.....	Telephone, quarter ending June 30.....	13 50
	28	E. T. Turner.....	Services for May.....	100 00
	28	W. O. Kerr.....	Services and expenses, May.....	111 25
	1	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 6.....	8 25
	5	Priest & Benjamin.....	Printing circular letter.....	1 50
	8	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 7.....	8 25
	8	Philadelphia Photo-Engraving Co.....	April charts.....	28 50

FINANCIAL STATEMENT FOR THE FISCAL YEAR 1896-97 — (Concluded).

Date.	Order number.	To whom issued.	For what purpose.	Amount.	Total.
1897.					
June	15	Gregory & Apgar	Printing March report.	\$65 10	.....
	15	Priest & Benjamin	Crop Bulletin, vol. IX, No. 8	8 25	.....
	22	Priest & Benjamin	Crop Bulletin, vol. IX, No. 9	8 25	.....
	29	Priest & Benjamin	Crop Bulletin, vol. IX, No. 10	8 25	.....
July	2	Philadelphia Photo-Engraving Co.	May charts	28 50	.....
	6	Priest & Benjamin	Crop Bulletin, vol. IX, No. 11	8 25	.....
	6	E. T. Turner	Services for June	100 00	.....
	6	W. O. Kerr	Services and expenses, June	111 40	.....
	6	Wm. E. Mott	Services as computer	42 00	.....
	7	Gregory & Apgar	Printing April report	65 10	.....
	13	Priest & Benjamin	Crop Bulletin, vol. IX, No. 12	8 25	.....
	17	Philadelphia Photo-Engraving Co.	June charts	28 50	.....
	22	Gregory & Apgar	Printing May report	65 10	.....
	27	Priest & Benjamin	Crop Bulletin, vol. IX, No. 13	8 25	.....
	27	Priest & Benjamin	Crop Bulletin, vol. IX, No. 14	8 25	.....
	27	Andrus & Church	Office supplies	4 15	.....
August	2	Henry J. Green	Instruments	68 75	.....
	3	Priest & Benjamin	Crop Bulletin, vol. IX, No. 15	8 25	.....
	3	Wm. E. Mott	Services as computer	100 00	.....
	3	E. T. Turner	Service for July	100 00	.....
	3	W. O. Kerr	Services and expenses, July	113 55	.....
	10	Priest & Benjamin	Crop Bulletin, vol. IX, No. 16	8 25	.....
	10	Gregory & Apgar	Printing June report	65 10	.....
	17	Priest & Benjamin	Crop Bulletin, vol. IX, No. 17	8 25	.....
	19	The Draper Manufacturing Co.	Thermograph forms	30 00	.....
	19	Philadelphia Photo-Engraving Co.	July charts	28 50	.....
	24	Priest & Benjamin	Crop Bulletin, vol. IX, No. 18	8 25	.....
	31	Priest & Benjamin	Crop Bulletin, vol. IX, No. 19	8 25	.....

September		70	Wm. E. Mott.....	Services as computer.....	100 00
4	4	71	Gregory & Apgar.....	Printing July report.....	65 10
6	6	72	E. T. Turner.....	Services for August.....	100 00
6	6	73	W. O. Kerr.....	Services and expenses, August.....	118 27
7	7	74	New York & Pennsylvania Tel. & Tel. Co.	Telephone, quarter ending October 1.....	13 50
14	14	75	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 20.....	8 25
21	21	76	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 21.....	8 25
22	22	77	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 22.....	8 25
28	28	78	Philadelphia Photo-Engraving Co.	August charts.....	28 50
30	30	79	Priest & Benjamin.....	Crop Bulletin, vol. IX, No. 23.....	8 25
30	30	80	Wm. E. Mott.....	Services as computer.....	60 00
30	30	81	E. T. Turner.....	Services and expenses, September.....	121 84
30	30	82	W. O. Kerr.....	Services and expenses, September.....	108 65
Total expenditures.....					\$4,970 64
Disbursements on orders issued prior to October 1, 1896.....					28 50
Unexpended balance, October 1, 1897.....					2,910 52
Unexpended balance, October 1, 1896.....					\$3,409 66
Legislative appropriation, Session 1897.....					4,500 00
					\$7,909 66



SECTION II.

Meteorological Tables and Summaries for Each
Month and the Year.



Meteorological Summary for January, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during January was 30.11 inches. The highest barometer was 30.93 inches at Friendship on the 31st, and the lowest was 29.40 inches at Buffalo on the 17th. The pressure was unevenly distributed, being lowest in the Great and Central Lake Regions. The average of the mean pressures at six stations of the National Bureau was 0.01 inches below the normal.

The mean temperature of the State was 22.3 degrees, as derived from the records of 76 stations. The highest local mean was 30.2 degrees at Setauket, and the lowest, 13.9 degrees, at Saranac Lake. The highest general daily mean was 46 degrees on the 4th, the lowest being 3 degrees on the 25th. The maximum temperature reported was 62 degrees at Erie, Pa., on the 3d, and at Ogdensburg on the 4th, and the minimum was 26 degrees below zero at Saranac Lake on the 24th and 25th, and at Number Four and Ogdensburg on the 25th. The mean monthly range of temperature for the State was 64 degrees, the greatest local range being 88 degrees at Ogdensburg, and the least, 44 degrees, at Manhattan Beach. The mean daily range was 16 degrees. The greatest local daily range was 63 degrees at Ogdensburg on the 18th, and the least, 1 degree, at Palermo on the 10th. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 21.9 degrees; the Eastern Plateau, 22.8 degrees; the Northern Plateau 17.7 degrees; the Atlantic Coast, 28.6 degrees; the Hudson Valley 25.1 degrees; the Mohawk Valley, 20.2 degrees; the Champlain

Valley, 19.7 degrees; the St. Lawrence Valley, 19.2 degrees; the Great Lakes, 23.9 degrees; the Central Lakes, 24.2 degrees. The average of the mean temperatures at 25 stations possessing records for previous years was 0.3 degrees below the normal, excesses occurring at only 8 scattered stations.

The mean relative humidity was 79 per cent. The mean dew point was 18 degrees.

The average precipitation, as derived from the records of 104 stations, was 2.39 inches of rain and melted snow. The heaviest general precipitation, exceeding four inches, occurred on portions of the highlands east of the lakes, and near the coast; while in much of central and northwestern New York the amount was under 2 inches. The largest local amount was 6.78 inches at Palermo, and the least, 0.60 inches, at Eagle Mills, Rensselaer county. The average total snowfall at 63 widely distributed stations was 17.9 inches. The largest fall, averaging over 30 inches, occurred on the Northern Plateau, the least being about one-half that amount over the Central Lake Region and the Eastern Plateau. The greatest local snowfall was 53.0 inches at North Lake, Herkimer county. The average precipitation at 27 stations possessing records for previous years was 0.14 inches below the normal amount, excesses occurring at only 7 scattered stations.

The average number of days on which the precipitation amounted to 0.01 inches or more was 10; the storm frequency being greatest in western New York and on the Northern Plateau, and least in the eastern section. The average number of clear days was 7.6; of partly cloudy days, 9.0; and of cloudy days, 14.4; giving an average cloudiness of 60 per cent. for the State. The cloudiness was greatest in western New York, decreasing toward the east.

The prevailing winds were from the west. The average total wind-travel at six stations of the National Bureau was 10,357 miles,

the values being generally greater than usual at both coast and lake stations. The maximum velocity recorded was 59 miles per hour at Buffalo on the 17th.

Distant thunder was noted at New Lisbon on the 4th, and on the 17th thunderstorms were reported from the extreme southwestern section, being violent near the shore of Lake Erie.

Hail fell on the 17th and 24th, and sleet on the 4th, 5th, 10th, 14th, 15th, 17th and 20th.

Auroras were reported from three stations on the 2d, and from one station on the 29th.

GENERAL FEATURES OF THE WEATHER.

The temperature conditions of January varied widely, mild weather during the first decade being followed by a period of large fluctuations until the last week, which was uniformly cold. Several stations reported maxima of 60 degrees or more on the 4th and 5th, while on the coldest day, the 25th, the minima reached 26 degrees below zero in northern New York.

The precipitation over the greater part of the State was light, the number of stormy days being considerably less than usual. General rains occurred on the 4th and on the 17th and 28th near the coast ; but with these exceptions precipitation generally occurred in the form of snow. Warm waves on the 10th and 17th prevented the snow covering from remaining long on the ground in the central and southern sections ; but during the cold period following the 23d the depth was greater than at any previous time during the winter, the high winds which prevailed at the time causing much drifting, especially in the western and southeastern counties.

About the usual cloudiness for the winter months obtained during January.

Our weather conditions were influenced this month by six areas of high, and seven areas of low pressure; the latter number being less than the usual storm frequency for January. The depressions generally passed in the vicinity of the great lakes, and thence down the St. Lawrence valley; storms of this class being nearest New York on the 5th, 10th, 18th, 21st and 23d. A deep depression developed in the St. Lawrence valley on the 26th, and a severe cyclone passed northward beyond the coast line on the 28th. The first low spread over eastern Canada on the 4th, giving warm southerly winds and general rains, turning to sleet and snow in the rear of the storm. The storm of the 18th also brought a warm wave, general light rains and snow, with the maximum wind velocity of January, and the gales continued with but little intermission until the end of the month. The three depressions which passed near New York during this period were strongly developed, bringing heavy snows in various portions of the State.

The high pressure systems were principally felt in this vicinity about the 1st, 8th, 13th, 20th, 25th and 31st. All excepting the fourth were strongly developed, and gave a decided fall of temperature in passing over the eastern States. The high winds and cold weather of the last decade occurred coincidently with an extraordinary increase of pressure in the northwest, the minimum temperatures for the month occurring on the 25th, when the anticyclonic system spread eastward to the coast. The highs generally followed a more northerly course than usual, passing centrally in this vicinity.

Reports from 38 observers show that on the 15th the depth of snow on the ground averaged about 2 inches or less, although in portions of the Adirondack highlands a foot or more was measured. The depth on the 31st averaged about 10 inches, the measurements

varying from 4 inches in the southern section to 36 inches in northern Herkimer county. There was little sleighing in central and southern New York until the last week.

Plowing was carried on to a considerable extent during the first week, the frost being well out of the ground. The absence of snow during the variable weather which followed was considered trying to winter wheat. Ground water was generally low during the month.

Large quantities of good ice was secured after the 11th.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Western Plateau.</i>														
|| Alfred	Allegany	1795										21.9	60	a
Angelica	"	1340									18.8	19.5	57	4
Bolivar	"											19.2	58	4
Friendship	"	1550	30.18	30.93	31	29.54	17	1.39				19.8	59	4
												20.6	59	4
<i>Franklinville.</i>														
Franklinville	Cattaraugus	1598										19.6	56	4
Humphrey	"	1950									21.6	21.6	54	3
‡ Arkwright	Chautauqua	1260										23.2	55	3
Jamestown	"	1328										22.4	57	b
Elmira	Chemung	863										24.7	58	3
<i>Avon.</i>														
Avon	Livingston	585										23.4	60	4
<i>Mt. Morris</i>														
Mt. Morris	"	525												
<i>Lockport</i>														
Lockport	Niagara										26.2	25.8	60	a
<i>Victor</i>														
Victor	Ontario													
<i>Wedgewood</i>														
Wedgewood	Schuyler	1350									20.7	21.5	55	c
Addison	Steuben	1000									24.0	24.0	59	4
South Canisteo	"	1480							79	16	20.8	21.2	59	4
Arcade	Wyoming	1707									19.7	20.1	55	4
<i>Eastern Plateau</i>														
Binghamton (1)	Broome	870										22.8	58	d
Binghamton (2)	"	875	30.15	30.80	31	29.63	21	1.17			23.6	24.7	55	e
Oxford	Chenango	550										24.0	57	4
Cortland	Cortland	1120										22.6	53	4
												21.4	52	4
<i>South Kortright</i>														
South Kortright	Delaware	1700										21.7	56	4
<i>Brookfield</i>														
Brookfield	Madison	1350												
<i>Middletown</i>														
Middletown	Orange	660												
<i>Port Jervis</i>														
Port Jervis	"	470										25.1	57	4
<i>Cooperstown</i>														
Cooperstown	Otsego	1300									21.4	21.6	55	4
<i>Garrattsville</i>														
Garrattsville	Otsego										22.1	22.5	56	4
<i>New Lisbon</i>														
New Lisbon	"	1234									20.3	20.3	55	3
<i>Oneonta</i>														
Oneonta	"	1100									25.8	26.2	57	4
Perry City	Schuyler	1038									21.8	21.0	58	9
<i>Straits Corners</i>														
Straits Corners	Tioga											22.2	54	4
<i>Waverly</i>														
Waverly	"	825									23.6	24.2	58	3
<i>Dryden</i>														
Dryden	Tompkins													
<i>Mohonk Lake</i>														
Mohonk Lake	Ulster	1245									22.6	23.4	51	5
<i>Northern Plateau.</i>														
Saranac Lake	Franklin	1350										17.8	55	3
Gloversville	Fulton	802										13.9	55	3
Little Falls (2a)	Herkimer	1520									20.4	20.2	49	4
												19.6	53	4
<i>North Lake</i>														
North Lake	Herkimer											17.8	50	5
Lowville	Lewis	900										18.4	54	4
Number Four	"	1571	30.11	30.86	31	29.56	22	1.30				17.2	53	4
<i>Atlantic Coast.</i>														
Brooklyn	Kings	107										28.6	57	4
Manhattan Beach	"											28.4	51	4
												27.6	48	f

FOR JANUARY, 1897.

TURE—(IN DEGREES FAHR.).							SKY.			PRECIPITATION—(INCHES).						Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	+ Duration.	Date.	Total snowfall.		
-21	31	66	16	51	31	2	25	8.7	7.8	14.5	11.4	2.33	0.80	<i>h. m.</i>	23	.....	.....
-6	13	63	17	38	31	6	25	1	9	21	17	3.33	0.75	.....	23	27.5	S. W.
-20	31	78	18	40	31	2	17	.....	.....	.....	15	3.12	0.54	.....	4	20.0	W.
-16	31	75	19	46	31	5	17	6	7	18	14	2.31	0.57	.....	4	15.5	S. W.
-17	31	70	20	47	31	6	25	6	11	14	14	2.29	0.57	.....	4	15.6	W.
-21	31	77	18	51	31	4	<i>ac</i>	6	7	19	20	2.54	0.47	7.00	4	26.5	S. W.
-3	<i>g</i>	57	15	29	18	8	<i>ad</i>	2	8	21	15	3.06	0.69	.....	4	26.5	S. W.
1	<i>h</i>	54	11	29	18	4	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
-7	25	64	15	39	31	7	11	5	8	18	17	4.29	0.71	21.15	18	32.5	S. W.
1	24	57	14	27	18	4	28	17	1	13	4	1.40	0.54	.....	5	.....	N. W.
-8	20	68	18	40	20	6	7	.....	.....	.....	6	1.97	0.80	.....	28	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	15	3	13	5	1.40	0.60	12.00	4-5	9.0	W.
-2	25	62	14	27	20	6	26	12	10	9	7	1.87	0.80	.....	28	17.5	W.
.....
-3	<i>i</i>	58	17	30	18	7	<i>ae</i>	5	17	9	8	1.85	0.43	.....	5	13.5	S. W.
-5	31	64	15	30	31	6	<i>af</i>	15	4	12	9	1.54	0.57	.....	5	8.0	S. W.
-9	31	68	19	40	31	7	28	12	7	12	8	2.34	0.50	.....	27	15.0	N. W.
-7	13	62	15	32	<i>m</i>	2	25	3	11	17	18	2.70	0.59	8.00	4	18.5	.....
-13	<i>j</i>	59	15	39	<i>s</i>	4	<i>ag</i>	5.7	10.4	14.9	9.1	1.77	1.40	.....	21	.....	.....
-2	25	57	14	32	18	4	28	3	13	15	13	1.45	0.48	.....	5	8.5	N. W.
0	<i>i</i>	57	13	37	18	4	<i>bb</i>	2	10	19	13	1.11	0.39	.....	5	.....	W.
-3	25	56	18	32	<i>t</i>	10	<i>bc</i>	2	9	20	9	1.76	0.38	.....	5	12.8	S.
-6	20	58	13	26	20	4	10	13	9	9	16	2.68	0.40	.....	6	.....	N. W.
-8	31	64	18	31	18	8	10	.....	.....	.....	2	0.94	0.56	.....	28	.....	.....
.....
0	31	57	13	30	13	4	28	7	15	9	11	2.91	1.40	.....	21	12.5	N. W.
-6	19	61	14	35	18	5	<i>bd</i>	10	9	12	8	1.72	0.63	.....	28	12.5	N. W.
-6	19	62	17	39	2	7	15	7	14	10	10	3.15	1.29	13.00	27	13.5	W.
-7	<i>j</i>	62	16	33	18	5	28	3	8	20	8	1.14	0.34	.....	28	11.5	S. W.
0	20	57	15	30	20	7	11	.....	.....	.....	4	1.22	0.61	.....	28	.....	.....
-13	<i>j</i>	71	18	39	20	7	28	2	8	21	13	1.81	0.46	.....	5	14.2	S. W.
-4	20	58	15	27	<i>u</i>	5	17	10	8	13	12	1.31	0.60	19.00	27-28	13.5	N. W.
-1	<i>m</i>	59	17	37	31	6	28	4	11	16	9	1.72	0.71	.....	5	8.8	N. W.
0	25	51	12	23	1	4	16	1	19	11	4	1.89	0.67	19.00	27-28	12.0	N. W.
-26	<i>h</i>	73	20	57	31	2	<i>be</i>	7.5	8.0	15.5	12.5	3.05	1.80	.....	26	.....	.....
-26	<i>h</i>	81	27	57	31	7	<i>ce</i>	11	7	13	12	2.48	0.72	.....	28	27.0	W.
-11	19	60	15	31	31	5	<i>cd</i>	9	7	15	18	2.48	0.59	13.30	20-21	22.4	W.
-15	<i>k</i>	68	21	55	18	2	9	9	3	19	14	1.97	0.51	.....	20	32.0	W.
-20	<i>j</i>	70	19	44	21	2	30	7	8	16	10	5.50	1.80	.....	26	53.0	N. E.
-25	25	79	19	37	31	3	28	5	15	11	12	2.72	0.50	.....	21	30.0	W.
-26	25	79	18	37	18	6	<i>cc</i>	4	8	19	9	3.15	0.70	.....	23	31.1	S. W.
0	20	48	14	39	20	1	17	12.8	6.0	12.7	8.0	3.68	2.05	16.00	21	.....	.....
6	24	45	11	31	18	3	<i>eg</i>	11	3	17	10	4.14	2.05	16.00	21	23.0	W.
4	26	44	13	32	<i>v</i>	2	12	17	2	12	6	2.82	1.20	.....	28-29	16.0	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Atlantic Coast (con.)</i>														
New York City.....	New York...	314	30.12	30.72	31	29.43	28	1.29	77	..	29.0	54	5	
Willeys Point.....	Queens.....	...	...	...	...	...	...	...	...	...	28.4	56	4	
Brentwood.....	Suffolk.....	75	...	...	...	...	...	...	...	...	28.0	57	4	
Setauket.....	Suffolk.....	40	...	...	...	...	...	...	71	21	29.9	30.2	56	e
Bedford.....	Westchester..	290	...	...	...	...	...	...	...	...	27.8	54	4	
Primrose.....	".....	200	...	...	...	...	...	...	...	...	28.4	55	4	
<i>Hudson Valley</i>														
Albany.....	Albany.....	85	30.11	30.82	31	29.41	28	1.38	81	19	25.1	56	4	
Lebanon Springs.....	Columbia.....	930	...	...	...	...	...	...	...	...	25.0	52	4	
Honeymead Brock..	Dutchess.....	450	...	...	...	...	...	...	...	...	24.8	56	4	
Poughkeepsie.....	".....	181	...	...	...	...	...	...	...	...	24.4	55	4	
											25.0	53	5	
Wappinger's Falls..	Dutchess.....	...	...	...	...	...	...	...	...	...	26.0	54	4	
Catskill.....	Greene.....	...	...	...	...	...	...	...	...	...	26.1	55	4	
West Point.....	Orange.....	167	...	...	...	...	...	...	...	...	26.2	51	5	
Carmel.....	Putnam.....	500	...	...	...	...	...	...	...	...	25.7	51	4	
<i>Mohawk Valley</i>														
Little Falls (1a)....	Herkimer.....	924	...	...	...	...	...	...	...	...	20.2	55	4	
Canajoharie.....	Montgomery..	...	...	...	...	...	...	...	...	...	22.6	51	4	
St. Johnsville.....	".....	...	...	...	...	...	...	...	...	...	20.0	52	4	
Rome.....	Oneida.....	445	...	...	...	...	...	...	...	...	19.2	55	4	
<i>Champlain Valley..</i>														
Plattsburgh Barracks..	Clinton.....	125	...	...	...	...	...	...	...	...	19.7	54	5	
Glens Falls.....	Warren.....	340	...	...	...	...	...	...	...	...	16.6	54	4	
Lake George.....	".....	...	...	...	...	...	...	...	83	17	21.2	52	4	
<i>St. Lawrence Valley</i>														
Madison Barracks..	Jefferson.....	266	...	...	...	...	...	...	...	...	19.2	62	4	
Watertown.....	".....	486	...	...	...	...	...	...	...	...	19.4	59	5	
Canton.....	St. Lawrence..	304	...	...	...	...	...	...	...	...	20.4	59	4	
North Hammond... St. Lawrence.		340	...	...	...	...	...	...	...	...	19.6	20.1	54	4
Ogdensburg.....	".....	258	...	...	...	...	...	...	...	...	19.7	62	4	
Potsdam.....	".....	300	...	...	...	...	...	...	...	...	16.2	16.6	58	4
<i>Great Lakes</i>														
Westfield.....	Chautauqua..	...	...	...	...	...	...	...	...	...	23.9	62	3	
Buffalo.....	Erie.....	690	30.18	30.75	31	29.40	17	1.35	77	19	24.8	61	b	
											25.0	59	4	
Pittsford.....	Monroe.....	...	...	...	...	...	...	...	...	...	24.3	24.0	60	4
Rochester.....	".....	523	30.08	30.76	31	29.47	17	1.29	74	17	24.0	60	4	
Appleton.....	Niagara.....	301	...	...	...	...	...	...	...	...	24.8	59	3	
Fort Niagara.....	Niagara.....	263	...	...	...	...	...	...	...	...	26.0	60	b	
Baldwinsville.....	Onondaga.....	390	...	...	...	...	...	...	...	...	23.4	22.4	59	4
Oswego.....	Oswego.....	304	30.07	30.78	31	29.46	22	1.32	84	20	23.0	60	4	
Palermo.....	Oswego.....	460	...	...	...	...	...	...	...	...	21.2	20.6	57	4
Lyons.....	Wayne.....	407	...	...	...	...	...	...	...	...	25.3	24.8	60	4
Erie, Pa.....	Erie.....	681	30.12	30.71	31	29.45	17	1.26	82	19	24.0	62	3	

FOR JANUARY, 1897—(Continued).

TEMPERATURE—(IN DEGREES FAHR.).							SKY.		PRECIPITATION—(INCHES).					Prevailing direction of wind.			
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.		Duration.	Date.	Total snowfall.
5	25	49	13	29	18	5	3	11	7	13	11	3.51	1.71	<i>h. m.</i>	21	11.7	N. W.
7	49	15	33	29	20	6	15	.....	.....	.....	5	3.54	1.65	.....	20	8.4	N. W.
0	20	57	17	39	20	7	15	12	5	11	7	4.40	1.80	21.00	27-28	19.7	N. W.
9	25	47	11	25	20	6	8	12	9	10	8	3.8	2.00	19.30	28	21.0	W.
4	20	50	16	25	20	7	3	11	10	10	12	3.92	1.65	24.00	21-22	16.2	W.
6	49	14	33	20	20	4	28	12	6	13	5	3.26	1.55	.....	21	13.5	.....
-12	31	57	15	36	20	3	15	7.7	8.4	14.9	8.5	2.57	1.25	15.00	21	.....	.....
-4	31	56	14	33	18	5	29	6	9	16	7	1.62	0.96	.....	28	11.8	W.
-9	31	65	17	31	31	2	22	5	4	22	9	2.99	0.78	.....	28	21.2	N. W.
1	54	15	28	20	4	28	6	11	14	10	10	2.36	0.70	9.00	4	7.1	N.
-7	60	17	36	30	6	25	8	10	13	6	6	1.62	0.70	17.00	28	7.5	N.
-12	31	66	16	36	31	6	23	11	9	11	12	2.77	0.95	19.00	28	18.5	N.
1	13	50	14	26	18	4	15	5	14	12	5	2.68	0.48	15.30	5	13.5	N. W.
5	20	46	15	30	19	3	15	.....	.....	.....	7	3.05	1.25	15.00	21	14.5	N. W.
3	20	51	14	25	10	7	19	13	2	16	11	3.45	1.00	17.00	28	13.0	.....
-12	r	62	16	34	1	4	28	10.0	7.3	13.7	12.0	1.49	0.39	.....	25	.....	.....
-12	r	67	15	31	1	4	28	9	6	16	15	1.01	0.18	5.00	5	21.5	W.
-7	25	58	15	31	18	4	28	14	4	13	6	0.69	0.26	.....	2	10.5	W.
-9	25	61	16	33	y	4	28	7	12	12	15	1.14	0.36	.....	28	8.4	W.
-9	18	64	17	29	11	2	ce	.....	.....	.....	12	3.10	0.39	.....	25	.....	.....
-18	g	67	18	54	19	5	d	8.0	7.0	16.0	7.3	2.51	1.37	.....	29	.....	.....
-18	g	72	18	54	19	6	de	.....	.....	.....	10	2.98	1.37	.....	29	.....	W.
-10	25	62	16	29	18	5	28	6	7	18	6	2.37	0.86	.....	21-22	16.5	W.
-14	25	66	19	34	31	5	17	10	7	14	6	2.19	0.79	15.00	21	16.5	N. W.
-26	25	81	18	63	18	3	27	7.8	15.2	8.0	9.0	1.91	0.76	.....	28	.....	.....
-21	25	80	19	41	19	8	10	.....	.....	.....	8	1.29	0.76	.....	28	14.8	S. W.
-16	25	75	14	28	6	3	27	8	14	9	14	2.46	0.44	.....	5	.....	S. W.
.....
-24	25	78	16	36	18	6	ee	2	25	4	9	1.47	0.60	.....	21	19.2	W.
-26	25	88	21	63	18	5	25	11	11	9	8	1.65	0.60	14.00	20-21	13.0	S. W.
-24	25	82	20	48	18	7	27	10	11	10	6	2.70	0.70	19.00	21	27.0	S. W.
-9	14	61	14	35	18	1	10	3.8	7.7	19.5	15.0	3.21	1.20	.....	24	.....	.....
0	25	61	14	28	18	5	21	5	4	22	7	1.93	0.40	.....	11	13.0	S. E.
0	24	59	13	25	aa	4	10	1	12	18	16	3.60	1.15	.....	6	.....	W.
-1	19	61	15	29	20	5	27	4	7	20	14	1.83	0.33	.....	4	.....	W.
1	25	59	15	31	18	3	29	3	7	21	20	2.47	0.32	.....	4	20.1	W.
1	25	58	14	29	18	3	29	2	7	22	18	1.42	0.29	.....	21	14.3	S. W.
-1	25	61	15	29	18	5	28	.....	.....	.....	11	0.96	0.32	.....	20	10.0	W.
-3	30	62	17	35	18	5	26	7	4	20	14	5.40	1.30	.....	24	44.5	.....
-1	19	61	14	33	18	4	26	5	3	23	20	6.05	1.20	.....	24	.....	S. E.
-9	14	66	14	31	15	1	10	5	12	14	18	6.78	1.05	.....	11	59.8	S. E.
2	24	58	12	33	18	3	27	4	13	14	8	2.27	0.82	.....	4	14.5	S. E.
-5	25	67	13	25	4	4	29	2	8	21	19	2.57	0.39	.....	24	.....	S. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.
													Date.
<i>Central Lakes.....</i>												24.2	59 c
Fleiming	Cayuga.....	1000									23.9	24.0	59 c
Romulus.....	Seneca	719							79	17		24.8	59 4
Ithaca	Tompkins	810	30.09	30.77	31	29.51	22	1.26	73	16	24.0	23.7	55 c
Mean..			30.11	30.93	31	29.40	17	1.90	79	18		22.3	62 c

* Mean of the tri-daily observations. † Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4, four hours. (1) Voluntary Observer. (2) U. S. Weather Bureau. (1a) City Reservoir; (2a)

(a) 2, 3, 4; (b) 2, 3; (c) 3, 4; (d) 3, 9; (e) 4, 5; (f) 1, 5, 18; (g) 25, 26; (h) 24, 25; (i) 19, 20, 25; (j) 5, 18, 20; (v) 19, 21; (w) 1, 9, 30, 31; (x) 19, 30, 31; (y) 12, 18; (aa) 4, 18; (ab) 18, 20; (ac) 7, (bd) 4, 11; (be) 9, 30; (cc) 16, 22; (cd) 17, 29; (ce) 10, 21, 26, 28; (dd) 17, 28; (ae) 3, 29; (ee) 4, 28;

FOR JANUARY, 1897—(Continued).

TURE—(IN DEGREES FAHR.).										SKY.		PRECIPITATION—(INCHES).						WIND.			
Lowest.	Date.	Monthly range.		Mean daily range.		Greatest daily range.		Date.	Least daily range.		Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	+ Duration.	Date.	Total snow fall	Prevailing direction.
-6 0	<i>j</i> 20	60 59	15 15	32 32	<i>ab</i> 18	4 7	30 11	4.0 1	13.0 22	14.0 8	7.0 7	1.46 1.90	0.62 0.40	<i>h. m.</i> 10.30	4-5 28	..... 16.0	..... .....	..... .....	..... .....	..... .....	..... S.
-2 -6	<i>j</i> <i>j</i>	61 61	15 14	31 32	18 20	7 4	24 30	9 2	5 12	17 17	4 10	0.97 1.50	0.60 0.62	..... 10.30	5 4-5	3.9 11.7	..... .....	..... .....	..... .....	..... S. E.	
-26	<i>h</i>	64	16	63	18	1	<i>ef</i>	7.6	9.0	14.4	10.0	2.40	2.05	16.00	21	17.9	.....	.....	.....	W.	

Thermograph. || Report received too late to be used in computing means. The means from the +Blank indicates that the duration is not shown in the original records, but is within twenty Intake Conduit nine miles north of city.

19, 20; (*k*) 18, 19; (*m*) 20, 31; (*n*) 13, 20, 25; (*p*) 13, 20; (*q*) 30, 31; (*r*) 19, 25; (*s*) 2, 20; (*t*) 5, 31; 25; (*ad*) 21, 25, 28; (*ac*) 16, 17; (*af*) 17, 28; (*ag*) 10, 16, 24, 28, 30; (*bb*) 24, 30; (*bc*) 4, 10, 16, 17; (*ef*) 10, 17; (*eg*) 9, 14.

TEMPERATURE — JANUARY, 1897, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	34	43	46	48	31	18	21	22	21	32	26	12	9	20
Alfred.....	43	50	55	58	36	23	24	29	39	36	29	18	21	33
Angelica.....	21	35	38	36	20	9	9	5	6	26	18	0	-11	13
Bolivar.....	44	49	55	59	37	26	24	33	37	32	30	15	25	29
	21	33	36	35	20	7	12	2	7	23	20	-1	-8	10
Friendship.....	46	52	56	59	41	23	26	33	28	38	32	21	25	27
	24	35	36	35	18	9	8	2	8	25	17	-6	-10	16
Franklinville.....	43	51	54	56	41	22	20	32	37	37	28	23	21	26
	24	35	38	40	22	8	16	3	3	28	22	4	-18	15
Humphrey.....	41	52	54	53	35	20	26	43	37	36	28	20	18	28
	29	33	36	35	17	7	14	15	15	26	18	5	0	16
Arkwright.....	46	57	57	55	35	22	23	33	38	36	27	20	24	30
Jamestown.....	32	37	40	35	18	9	14	16	16	27	29	7	0	19
Elmira.....	44	44	58	56	40	24	31	31	38	36	35	28	20	29
	24	35	34	51	29	14	22	13	13	29	26	9	7	18
Avon.....	41	50	58	60	43	30	28	30	36	39	31	26	22	22
	21	37	34	42	24	14	22	13	12	29	22	10	0	-5
Mount Morris.....	50	60	60	60	43	32	32	34	40	38	34	20	28	30
Lockport.....	28	43	42	39	26	15	24	21	17	30	25	12	8	12
Victor.....	41	46	55	55	43	25	29	34	36	36	30	21	17	33
Wedgewood.....	18	32	35	40	24	10	13	12	13	25	19	1	0	10
Addison.....	41	45	54	59	45	28	29	32	39	40	33	23	23	28
	21	35	34	43	27	15	17	12	13	32	23	9	3	19
South Canistoe.....	42	46	56	59	37	27	29	34	39	38	34	21	18	28
	22	32	35	37	22	9	10	6	9	27	21	2	-4	9
Arcade.....	44	52	54	55	36	22	25	31	35	34	27	16	22	25
	25	37	37	36	17	10	13	10	11	26	16	0	-7	11
<i>Eastern Plateau...</i>	27	27	43	48	27	23	23	29	23	31	27	15	13	19
Binghamton (1).....	40	40	50	55	55	30	28	30	36	38	31	25	26	28
	20	31	37	48	26	17	19	10	12	27	23	8	8	18
Binghamton (2).....	40	43	54	57	41	27	29	29	38	38	30	21	21	26
	20	36	38	42	29	17	19	13	12	29	22	8	9	19
Oxford.....	35	40	50	53	52	33	33	30	35	35	34	27	21	30
	13	28	32	43	20	13	18	8	7	25	22	5	6	6
Cortland.....	34	38	48	52	50	33	28	28	32	30	29	27	13	25
	19	30	33	40	29	14	18	9	7	26	23	8	6	8
South Kortright.....	36	45	52	56	53	29	28	27	34	34	31	22	19	30
	12	28	35	41	25	15	17	10	7	26	20	1	-4	12
Brookfield.....	32	42	47	57	43	31	30	30	36	39	37	21	35	25
Middletown.....	15	18	33	40	38	23	20	15	12	23	29	10	5	18
Port Jervis.....	35	42	53	55	51	27	27	23	33	33	28	23	16	24
Cooperstown.....	15	32	34	50	27	10	21	12	8	27	23	4	3	10
Garrattsville.....	44	55	52	56	51	28	29	27	33	34	31	27	26	28
	25	16	35	47	21	14	19	11	6	23	22	4	6	9
New Lisbon.....	36	40	57	52	26	28	29	33	34	30	29	22	16	29
	12	31	47	21	14	30	5	2	25	19	12	3	3	2
Oneonta.....	40	45	55	57	55	34	33	32	39	39	34	30	21	32
	18	34	40	44	30	20	23	14	11	31	27	8	10	11
Perry City.....	39	44	53	58	40	25	28	29	36	35	28	24	22	27
	15	32	34	40	25	13	12	8	8	25	24	5	6	2
Strait's Corners.....	35	40	51	54	52	28	30	30	34	36	31	25	17	27
	16	33	33	45	25	22	13	9	8	26	25	4	6	14
Waverly.....	42	44	58	57	49	27	30	40	40	36	34	28	20	29
	17	36	33	47	32	15	15	9	8	29	26	5	3	16
Mohonk Lake.....	38	37	46	50	51	32	31	28	28	36	31	26	21	21
	15	32	28	35	32	22	22	17	14	31	26	7	1	15

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
24	28	37	27	6	13	30	28	19	7	2	6	9	9	15	15	12	21.9
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19.5
84	35	39	33	12	26	35	34	28	15	4	9	13	9	21	20	20	19.2
16	13	31	12	-4	-7	18	23	11	0	-5	-4	-2	-2	7	-3	-20	19.2
34	37	39	36	11	27	36	33	23	15	4	13	20	14	20	22	30	19.8
17	13	34	13	-2	-5	23	20	10	-2	-5	-1	-1	3	5	0	-16	19.8
35	38	42	43	8	28	37	34	24	16	4	9	16	17	22	25	30	20.6
16	16	34	13	-6	-6	14	22	12	-1	-2	2	6	6	9	-4	-17	20.6
32	35	38	43	15	26	35	32	21	16	1	7	13	11	17	19	30	19.6
8	13	33	15	0	-10	14	21	12	1	-3	-2	1	3	5	5	-21	19.6
39	35	44	43	13	24	31	30	22	10	5	10	16	10	18	22	38	21.6
16	25	32	14	2	2	23	20	9	-1	-3	-3	2	2	7	13	14	21.6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	23.2
33	36	45	47	16	30	35	33	21	12	4	9	16	11	17	23	34	22.4
14	25	34	16	6	6	27	22	12	0	-7	-4	6	0	9	14	-5	22.4
33	39	43	42	15	28	45	35	25	18	10	16	20	14	25	24	34	24.7
22	33	27	15	5	3	25	25	17	1	3	6	6	10	10	11	9	24.7
26	37	44	40	15	32	38	36	34	11	16	...	...	16	22	25	24	23.4
0	4	32	30	-5	-8	26	22	14	-2	8	...	...	8	10	11	-4	23.4
...
35	39	46	22	14	34	40	39	28	13	6	12	21	22	29	34	29	25.8
20	28	37	6	3	7	30	23	14	0	-2	6	9	11	18	17	5	25.8
...
30	35	37	40	12	24	34	30	30	15	8	14	21	15	22	25	32	21.5
17	28	30	10	-3	-3	23	18	11	-1	-3	2	1	7	6	7	7	21.5
34	37	40	43	17	29	38	35	28	19	11	17	18	16	27	26	25	24.0
23	23	34	17	4	3	28	26	15	5	0	6	0	10	11	6	-5	24.0
34	37	40	44	10	25	41	35	25	14	5	12	21	13	22	36	31	21.2
19	17	30	14	-2	-3	21	19	11	0	-4	1	1	6	6	0	-9	21.2
33	36	41	41	10	28	34	32	22	11	1	6	18	9	18	21	31	20.1
13	17	33	10	-4	-4	24	20	11	0	-1	1	5	4	9	4	-1	20.1
...
25	30	35	27	5	11	31	29	23	12	5	11	14	14	18	17	14	22.8
30	35	40	44	12	25	40	35	34	18	9	16	16	16	22	22	24	22.8
23	29	28	12	0	0	24	24	16	4	-2	3	10	12	12	14	6	23.7
32	36	43	45	8	29	40	35	29	16	10	16	15	16	22	21	22	24.0
22	30	32	8	0	0	30	26	14	12	0	5	6	11	13	17	4	24.0
31	35	37	40	10	23	38	34	32	22	15	18	20	21	30	28	23	22.6
14	25	27	10	-1	3	18	19	15	4	-3	5	7	10	10	13	-4	22.6
28	30	34	36	14	20	35	30	28	12	9	13	17	17	19	25	25	21.4
17	24	28	14	0	-6	20	20	11	7	0	4	7	8	8	14	18	21.4
...
33	34	39	43	12	25	40	34	32	19	10	16	24	20	24	25	20	21.7
19	25	29	12	-5	-4	22	21	14	3	-3	1	7	10	9	4	-8	21.7
...
...
31	30	36	43	20	23	43	37	29	24	12	20	25	20	28	28	26	25.1
20	25	30	25	6	3	23	29	23	15	4	7	12	16	16	12	0	25.1
...
24	35	40	40	5	25	36	31	31	15	10	17	18	17	19	19	20	21.6
15	24	32	5	-6	-3	22	24	15	4	-4	4	10	11	12	6	-5	21.6
27	34	40	41	11	27	41	34	34	16	10	19	18	19	21	24	25	22.5
20	25	31	8	-6	-4	25	17	13	3	-2	6	10	4	12	10	5	22.5
30	33	38	43	10	23	40	33	23	24	9	15	16	16	21	22	26	20.3
13	25	30	10	-7	-7	22	22	16	2	-2	3	8	11	11	8	-2	20.3
34	39	43	41	9	30	42	37	40	22	15	20	25	23	27	25	29	26.2
21	30	34	13	1	0	28	27	20	9	3	8	12	15	16	15	6	26.2
33	36	38	28	16	26	36	34	32	15	9	16	22	16	24	23	23	21.0
17	20	30	9	-13	-13	24	22	12	-1	-2	3	0	9	10	8	-2	21.0
30	35	37	39	13	23	41	34	31	19	12	11	17	18	23	23	25	22.2
22	25	32	12	-3	-4	24	23	14	3	-2	2	2	10	9	7	3	22.2
32	37	41	43	16	26	37	35	27	20	11	20	22	16	29	28	36	24.2
25	27	33	14	2	-1	26	23	16	3	0	4	3	10	10	5	-1	24.2
26	29	35	36	18	20	36	33	26	20	11	23	22	22	28	30	27	23.4
19	25	28	18	4	4	24	27	17	8	0	5	12	14	14	11	8	23.4

TEMPERATURE—JANUARY, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau...</i>	32	33	40	45	36	23	16	18	12	25	22	6	-1	10
<i>Saranac Lake.....</i>	41	51	55	54	34	24	20	28	32	27	28	10	17	26
	0	33	34	33	16	2	-2	-6	-5	17	2	-24	-23	-17
<i>Gloversville.....</i>	30	11	40	19	48	29	27	29	27	32	31	24	15	21
	10	25	29	37	29	20	19	6	5	22	24	-4	-7	5
<i>Little Falls (2a).....</i>	43	38	17	53	45	43	23	46	7	42	42	35	15	22
	10	27	24	31	20	22	15	-3	5	35	-1	-11	-9	12
<i>North Lake.....</i>	32	33	44	48	50	32	19	22	28	30	27	25	.....	.....
	4	10	33	39	31	14	11	12	-4	-1	22	-1	.....	.....
<i>Lowville.....</i>	34	43	59	54	50	30	23	31	28	34	29	20	12	23
	11	39	35	42	32	16	10	16	1	25	17	-6	-21	-10
<i>Number Four.....</i>	34	45	48	53	51	26	21	26	28	30	27	17	13	22
	10	32	34	44	32	15	10	11	0	22	14	-12	-21	-4
<i>Atlantic Coast.....</i>	31	38	39	45	43	31	29	28	29	35	34	23	17	26
	56	42	43	51	46	30	34	34	35	45	42	27	26	30
<i>Brooklyn.....</i>	26	24	27	41	29	23	25	22	32	32	32	13	14	27
	18	36	42	46	48	45	30	32	34	32	46	24	24	26
<i>Manhattan Beach..</i>	26	26	24	36	44	28	24	20	20	20	24	22	12	12
	35	49	42	52	54	38	39	34	28	45	40	32	27	30
<i>New York City.....</i>	27	35	37	42	38	25	23	25	20	31	31	12	11	24
	56	42	45	56	50	32	40	35	39	42	45	33	28	31
<i>Willet's Point.....</i>	27	33	34	39	29	24	24	22	21	22	25	11	12	24
	42	48	47	.....	53	36	34	35	38	45	44	32	24	34
<i>Brentwood.....</i>	21	33	32	.....	31	25	17	16	12	30	24	15	8	22
	36	44	42	56	56	37	35	32	35	43	41	32	25	32
<i>Setauket.....</i>	28	35	35	36	37	27	24	26	24	31	32	16	11	24
	40	42	41	54	50	36	40	38	40	44	38	30	26	28
<i>Bedford.....</i>	15	31	34	34	35	25	21	17	15	28	26	13	5	20
	36	44	42	55	48	33	38	34	38	45	41	27	25	28
<i>Primrose.....</i>	13	32	34	36	41	27	20	18	15	28	23	22	6	22
<i>Hudson Valley.....</i>	23	35	39	43	42	30	36	24	23	33	30	19	11	19
	32	42	46	52	49	33	34	31	34	39	36	29	19	25
<i>Albany.....</i>	14	31	34	33	32	25	24	16	15	31	29	4	0	12
	33	39	50	56	53	34	30	29	28	35	33	27	17	29
<i>Lebanon Springs...</i>	10	31	30	43	33	21	19	11	6	22	19	6	-8	17
	34	40	42	55	44	27	34	29	32	39	35	20	18	25
<i>Honeymead Brook..</i>	8	31	34	39	30	22	19	13	9	30	24	8	1	15
	24	41	41	43	53	42	38	32	33	43	36	26	18	24
<i>Poughkeepsie.....</i>	8	28	32	32	36	25	20	16	11	32	23	10	0	14
	31	42	43	54	49	34	35	30	35	41	34	30	22	27
<i>Wappingers Falls...</i>	12	29	35	34	32	25	22	20	15	31	24	12	4	15
	32	41	44	51	48	34	37	32	33	38	36	28	23	24
<i>Catskill.....</i>	12	31	35	39	34	26	24	17	15	30	26	9	1	15
	45	33	42	41	51	50	30	34	31	39	41	38	23	23
<i>West Point.....</i>	16	18	32	34	37	27	24	21	18	18	26	20	6	7
	36	45	46	54	47	36	35	32	34	40	38	30	20	28
<i>Carmel.....</i>	15	33	34	39	36	26	23	18	14	15	23	10	3	20
<i>Mohawk Valley.....</i>	24	34	37	43	33	25	22	19	21	30	20	8	6	16
	45	39	51	55	34	24	23	28	35	31	29	9	12	18
<i>Little Falls (1a)...</i>	11	27	26	31	18	18	13	7	11	26	2	-4	0	11
	23	44	45	51	47	31	39	36	35	36	32	29	16	23
<i>Canajoharie.....</i>	14	24	31	37	29	21	23	14	10	26	27	2	-1	11
	31	40	36	52	49	29	26	26	27	32	28	28	14	21
<i>St. Johnsville.....</i>	13	27	26	35	27	20	13	9	4	25	6	-5	-6	5
	30	40	49	55	38	35	26	25	35	34	8	16	25	25
<i>Rome.....</i>	15	29	30	30	18	19	12	4	3	27	5	-6	-1	10
<i>Champlain Valley..</i>	18	29	37	41	40	29	24	19	16	27	26	13	3	9
	24	35	40	44	54	41	33	20	21	32	22	11	7	7
<i>Plattsb'h Barracks.</i>	6	5	31	31	34	27	12	10	6	5	18	10	-5	-5
	31	40	41	52	41	32	31	29	26	37	35	21	11	19
<i>Glens Falls.....</i>	6	26	32	31	32	21	18	11	7	25	19	2	-5	2
	34	39	43	52	50	33	31	32	28	37	35	21	14	20
<i>Lake George.....</i>	8	31	34	37	29	21	17	12	8	27	19	0	-6	10
	26	39	46	50	38	27	18	21	16	28	24	7	0	2
<i>St. Lawrence Valley.</i>	26	43	52	56	59	37	34	34	27	36	33	31	1	6
<i>Madison Barracks..</i>	9	18	37	39	31	19	15	16	2	28	18	0	-14	-11

REGIONS AND DAILY MAXIMA AND MINIMA FOR THE STATIONS—(Con.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
16	26	33	20	-5	8	25	26	18	3	-3	10	16	16	12	9	8	17.7
27	33	41	32	-5	33	35	27	21	10	8	17	25	20	20	28	35	13.9
-10	26	32	-23	-23	-10	22	20	-15	-26	-26	8	14	8	-21	-23	-22	
25	33	35	38	10	22	34	33	29	17	8	17	23	24	19	25	23	20.2
16	32	30	19	-11	-6	19	24	15	2	-5	7	10	16	14	10	-8	
24	36	41	40	1	31	35	32	26	15	25	20	23	20	20	17	21	19.6
11	23	31	-15	-15	-3	23	19	10	-12	-13	9	11	12	3	14	11	
20	27	32	37	30	20	31	32	27	20	20	14	16	20	29	14	19	17.8
14	12	25	30	-20	-5	13	21	18	-3	-19	-18	8	9	7	12	-17	
31	32	37	41	11	20	36	29	29	14	6	19	20	17	16	16	26	18.4
-2	14	30	11	-14	-7	20	24	15	-7	-25	5	16	14	11	-7	-11	
27	29	37	39	13	22	33	27	28	10	7	19	19	18	14	14	24	17.2
7	23	28	2	-21	-14	21	21	9	-5	-26	6	11	11	7	-10	-9	
30	35	38	35	18	21	29	26	30	20	12	15	21	21	22	22	23	28.6
33	40	42	43	19	35	47	40	34	27	15	23	27	20	24	32	33	28.4
29	32	35	12	13	14	33	25	22	6	7	9	20	13	19	17	17	
30	32	40	48	44	18	44	46	40	32	24	14	32	21	24	30	32	27.6
26	28	30	34	12	10	12	34	26	30	6	4	6	12	14	18	16	
32	43	46	50	20	40	47	42	37	24	15	24	27	24	32	30	20	29.0
26	30	32	21	9	12	37	32	22	10	5	6	16	14	14	19	16	
33	39	48	31	30	47	50	41	34	25	17	26	27	25	31	30	28	28.4
27	30	31	11	10	14	30	26	20	7	7	9	17	15	16	18	9	
36	41	46	49	25	39	48	43	37	29	19	28	27	29	27	32	40	28.2
29	30	31	25	4	0	32	33	24	17	7	7	15	20	14	3	5	
35	40	44	50	26	35	48	40	38	26	18	25	29	31	29	28	31	30.2
28	32	35	26	13	10	34	33	26	18	9	10	20	20	19	20	17	
84	39	40	48	25	30	48	42	34	24	17	25	29	26	31	32	35	27.8
23	28	31	24	9	4	29	32	23	15	5	8	14	18	18	10	12	
33	39	42	50	21	28	49	40	34	27	20	25	27	26	31	30	31	28.4
25	30	29	33	10	6	28	33	26	20	6	8	16	22	18	7	8	
24	29	34	23	12	13	22	34	26	20	10	17	21	22	22	15	13	25.1
25	35	44	45	12	26	39	38	35	21	16	26	27	25	24	26	23	25.0
18	24	32	12	-2	2	26	32	21	6	1	14	17	19	19	6	-4	
32	35	36	44	19	21	37	37	31	21	13	24	27	24	25	21	22	22.6
20	25	22	19	-6	-4	20	24	18	12	-3	6	14	17	14	0	-9	
29	34	40	43	14	29	44	36	33	27	17	27	25	25	27	24	23	24.4
20	35	32	19	2	1	28	31	20	9	3	8	11	21	18	6	5	
27	35	42	46	21	25	48	46	34	35	17	28	26	26	32	29	28	25.0
20	25	32	20	8	3	22	20	21	15	4	9	10	20	14	-7	-7	
34	37	42	47	22	25	46	40	22	36	18	25	36	31	30	28	24	26.0
18	26	32	18	10	5	21	32	16	18	4	8	26	21	18	-6	-12	
23	34	37	44	18	23	40	42	33	24	19	30	28	25	30	29	27	25.6
19	23	32	18	2	3	21	31	22	10	4	14	18	18	19	12	4	
25	38	36	48	45	17	42	42	39	33	25	16	22	27	27	20	26	26.2
22	22	27	32	9	5	10	32	25	16	6	7	9	16	16	10	15	
34	37	38	45	14	23	44	37	29	24	14	23	27	26	28	25	27	25.7
23	25	27	22	7	3	30	26	18	11	3	8	11	15	18	12	9	
20	29	36	20	1	13	28	28	21	10	3	12	16	17	15	10	10	20.2
25	32	44	34	0	32	34	31	24	12	12	15	12	16	18	12	23	18.4
16	25	32	12	-12	0	24	20	8	0	12	-8	7	12	5	1	6	
25	25	44	41	10	22	37	35	23	18	15	23	22	20	22	24	22	23.0
14	24	31	10	-4	-1	22	28	18	6	-7	12	15	16	17	11	-3	
23	33	39	45	17	19	33	33	30	23	16	17	20	19	20	19	22	20.0
11	22	30	12	-8	-2	19	25	19	8	-9	8	12	15	14	3	-4	
27	36	40	19	13	29	30	23	17	15	20	23	22	22	25	20	18	19.2
18	35	28	-9	-8	5	22	21	9	-5	-7	12	11	14	0	-8	-1	
14	23	32	30	6	4	22	31	24	10	-2	12	20	20	21	9	5	19.7
10	24	34	41	40	-1	22	35	29	25	4	13	23	20	21	21	14	16.6
-5	-2	24	32	-14	-14	-3	22	20	-7	-18	-18	13	12	15	1	-5	
25	35	37	42	13	23	37	35	33	22	13	25	30	24	30	20	15	20.8
15	22	28	13	-7	-3	21	27	16	5	-10	8	13	19	13	-3	7	
25	35	37	43	12	22	35	40	35	17	13	31	27	26	31	23	23	21.7
16	24	32	12	9	-4	22	26	11	0	-14	10	16	16	13	-8	-11	
9	26	38	24	-3	11	28	27	19	3	-7	14	21	18	13	6	7	19.2
11	28	39	43	30	16	37	37	31	24	11	20	23	23	20	15	8	19.4
-3	17	26	30	-11	-1	22	21	19	1	-21	7	12	14	5	-17	-15	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence (con'd)</i>														
Watertown	52	55	56	59	42	46	24	22	18	36	32	-1	13	1
	36	40	42	36	28	18	12	18	0	18	20	-7	-12	-10
North Hammond...	36	46	52	54	48	28	22	28	28	34	34	20	8	14
	14	36	36	48	26	18	14	14	10	20	20	-2	-2	-4
Ogdensburg	38	46	56	62	15	37	21	30	32	35	25	25	18	30
	17	35	37	40	30	17	10	14	8	19	14	-5	-10	-4
Potsdam	26	46	56	58	45	29	19	18	23	34	26	17	4	9
	9	23	34	43	26	18	4	8	3	20	14	-7	-11	-10
<i>Great Lakes</i>	34	47	50	48	31	32	24	25	27	33	26	16	13	16
Westfield	48	61	61	58	36	27	27	34	40	37	32	25	26	27
	34	41	43	35	20	17	19	18	20	30	23	16	4	16
Buffalo	50	57	58	59	37	27	26	35	40	34	30	19	21	24
	26	46	48	34	18	18	21	20	21	30	19	11	3	12
Pittsford	42	58	56	60	42	28	30	32	9	39	32	24	20	25
	22	40	43	40	23	16	24	20	17	28	22	8	8	3
Rochester	47	60	69	60	38	28	28	32	39	36	30	19	20	27
	24	42	41	33	21	16	24	22	17	28	19	10	8	11
Appleton	43	55	59	58	38	31	31	31	39	37	32	24	23	24
	25	36	36	38	24	16	23	22	18	31	24	10	10	11
Fort Niagara	46	60	60	57	40	32	32	37	40	39	31	27	21	27
	25	38	44	39	24	16	24	21	20	29	24	10	10	17
Baldwinsville	41	48	54	59	46	28	30	27	37	35	32	26	16	24
	21	35	38	33	18	18	11	6	9	25	12	2	3	7
Oswego	40	48	56	60	39	32	27	30	38	37	30	21	9	17
	19	36	39	39	28	18	18	21	8	29	21	5	3	6
Palermo	35	43	53	57	40	28	27	28	30	31	30	24	11	21
	15	35	36	40	28	16	16	17	3	30	24	3	3	-9
Lyons	42	47	54	60	40	28	31	32	38	40	32	25	19	16
	22	40	40	39	25	18	25	22	19	31	23	9	10	6
Erie, Pennsylvania.	51	61	62	57	32	27	24	32	40	34	32	23	24	27
	36	46	46	32	16	14	16	20	22	29	23	15	10	20
<i>Central Lakes</i>	31	41	48	50	36	23	26	24	26	34	29	17	15	20
Fleming	42	46	59	59	47	30	30	33	36	38	31	26	21	29
	21	35	38	45	26	15	22	16	15	28	24	8	9	12
Romulus	12	17	56	59	44	31	31	34	38	40	40	24	20	29
	20	36	39	42	28	16	22	16	18	28	24	9	10	9
Ithaca	39	43	55	55	41	30	30	32	36	38	32	25	18	27
	22	36	38	41	28	16	22	13	13	31	25	9	10	15
Mean	27	38	42	46	37	25	24	22	22	31	26	14	9	14

† Max. and min. by the Draper thermograph. ‡ Received too late to be used in computing conduit, nine miles north of the city.

MAXIMA AND MINIMA FOR THE STATIONS—(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
20	36	44	36	-5	30	38	32	24	8	8	22	24	20	17	13	22	20.4
0	26	38	22	-12	7	30	26	11	-2	-16	14	21	16	6	-2	0	
22	34	40	36	0	26	36	36	10	6	26	30	24	18	10	18	18	
4	22	34	0	-14	0	24	24	10	-8	-24	6	20	18	10	-4	-8	20.1
20	34	50	52	2	26	23	8	30	7	23	25	20	20	20	28	20	
2	17	34	-11	-20	-15	15	19	-8	-17	-26	5	17	15	5	5	5	19.7
16	33	44	40	10	22	33	28	29	20	6	21	23	20	19	12	23	
-5	13	33	-8	-18	-4	13	20	10	-14	-24	-9	16	12	6	-3	-1	16.6
21	30	40	26	12	18	32	28	21	10	6	12	13	14	19	17	15	23.9
31	43	50	47	21	32	34	35	26	17	6	9	14	15	20	24	29	
11	26	34	19	10	9	29	23	14	5	0	1	6	3	13	6	2	24.8
37	38	48	36	17	33	36	33	25	12	12	13	15	17	23	31	30	
16	29	36	11	4	10	29	23	12	0	1	9	10	8	17	17	10	25.0
29	37	45	39	12	31	38	34	29	15	11	17	17	16	24	25	28	
9	20	34	11	-1	2	28	23	13	0	0	10	12	10	15	11	3	24.0
28	38	45	39	8	30	38	33	25	13	12	15	16	21	21	23	28	
15	22	36	8	3	4	29	23	13	2	1	11	12	10	18	9	4	24.0
30	36	45	45	16	30	35	34	31	17	9	14	19	20	23	28	26	
23	24	33	16	5	4	28	20	15	3	1	6	9	10	20	12	4	24.8
30	34	48	47	19	33	36	36	31	18	18	14	18	14	24	28	34	
19	24	33	18	5	5	28	21	14	4	-1	6	6	9	15	19	10	26.0
29	36	43	34	12	36	39	35	30	18	14	19	20	20	23	25	23	
15	22	33	-1	2	8	25	24	9	4	4	14	13	13	9	-3	1	22.4
26	35	41	40	10	28	37	34	30	15	15	19	20	25	22	24	22	
12	22	33	7	-1	4	25	24	15	7	2	15	14	16	18	6	-1	23.0
26	32	38	28	10	25	25	33	31	15	8	17	17	20	20	20	19	
-5	17	31	10	-8	0	30	23	15	5	0	14	12	15	15	-8	-8	20.6
28	38	43	43	11	29	40	32	32	20	12	21	18	18	24	24	22	
14	21	35	10	3	3	29	25	16	2	4	13	15	12	17	18	10	24.8
30	40	52	36	20	33	38	34	24	16	3	8	12	15	19	23	25	
16	28	36	20	11	11	25	23	13	4	-5	-3	5	1	15	8	8	24.0
23	31	36	26	5	12	32	29	25	9	6	12	14	14	17	20	18	
29	35	39	42	11	26	38	33	34	16	11	17	20	18	22	23	28	24.2
15	25	26	10	1	0	23	23	13	2	1	8	11	10	11	15	11	
30	37	42	42	16	27	38	36	38	11	12	18	20	19	25	24	27	24.8
15	21	34	11	-2	-2	26	25	14	4	3	10	11	11	12	15	13	
32	37	40	42	12	26	39	34	34	18	10	16	17	17	23	22	26	
20	29	34	12	-6	-6	26	25	18	3	2	6	7	7	8	18	5	23.7
21	29	36	27	6	12	30	30	23	10	3	12	16	16	17	14	12	22.3

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir; (2a) Intake

DAILY AND MONTHLY PRECIP

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau.</i>	T.	0.00	0.00	0.31	0.29	0.09	0.02	0.00	T.	T.	0.06	0.02	0.00	T.
Alfred	T.			.54	.24	.15	.10			T.	.05	T.		
Angelica .....				.57	.18	.03	.04					.06		
Bolivar .....				.57	.12	.12	T.				.06	T.		
Friendship														
Franklinville	T.			.47	.27	.07	.02			T.	.03	.06		
Humphrey	T.			.69	.24	.06					.16			
Little Valley														
Cherry Creek .....				.33	.18	.28	.10			T.	.22	.11		
Jamestown .....				.49	.15	.40	.10				.20	T.		
Elmira .....				.05	.54									
Pine City				T.	.49	.02	T.				T.	.03		
Akron .....				.21	.05	.41			T.	.08	.04	T.		T.
Avon .....				.07	.41	T.	T.				T.	T.		
Mt. Morris				*	†.60					T.	T.			
Lockport .....				.12	T.	T.				T.	T.			
Victor														
Tyrone														
Wedgewood	T.			.17	.43	T.	T.				T.	T.		
Addison .....				.07	.57	T.	T.				T.	.02		
Atlanta .....					.65	.03					.03	.02		
Haskinville				T.	.52	.10								
South Canisteo .....				.70	T.	T.					.15			
Arcade	T.			.59	.17	.08	.03			T.	.13	T.		
Attica														
<i>Eastern Plateau.</i>	0.00	0.00	0.00	0.06	0.34	0.04	0.01	T.	0.00	T.	0.02	0.02	0.00	0.01
Binghamton (1) .....					.48	.02				T.	.05	.05		
Binghamton (2) .....					.39	.01	T.			T.	.03	.02		T.
Oxford .....					.38	.05				T.		T.		
Cortland .....					.06	.40	.12	.03				.04		
Deposit														
South Kortright														
Brookfield														
†Middletown														
Port Jervis .....					.33	.02						.02		.05
Warwick .....					.08									.05
Cooperstown .....					.15	.07								
Garrattsville .....					.15									
New Lisbon .....				.28	T.					.01		.04		
Oneonta .....				.19							.17			
Perry City .....				.13	.46						.05	.05		
Newark Valley .....				.13	.45						T.	.04		
Straits Corners				T.	.15		.02			T.	.01	.02		
Waverly .....				.02	.71	T.					.02			
Dryden														
Mohonk Lake .....				.35										
<i>Northern Plateau.</i>	0.00	0.00	0.00	0.03	0.19	0.10	0.07	T.	T.	0.09	0.11	T.	0.00	0.00
Saranac Lake				*	†.50	.04			*	†.10	.07	.01		
Gloversville .....					.10	.09	.07		T.	.04	.02	.01		
Little Falls (2) .....					.12	.02	.02	T.		.12	.11			
North Lake .....				.20	.30		.40			.40	.30			
Lowville .....					.10	.22					.16			
Number Four .....					.19	.34				T.	.10			
Kings Station .....					.35									
<i>Atlantic Coast.</i>	0.00	0.00	T.	0.26	0.36	0.01	0.00	0.00	0.00	0.00	T.	0.00	T.	0.01
Brooklyn .....				.20	.61						T.			.03
Manhattan Beach .....					.48	.10					T.		T.	T.
New York City .....				.07	.39						T.			.03
Willels Point .....				.80							T.			T.

TATION FOR JANUARY, 1897—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	T.	0.09	0.20	0.02	0.15	0.21	0.15	0.13	0.07	0.03	0.03	0.14	0.21	0.07	0.01	T.	2.31
.....	.....	.24	.40	.....	.30	T.	.15	.20	.15	.10	.....	.15	.25	.10	.....	.....	3.33
.....	.....	.17	.29	.....	.09	.20	.20	.16	.04	.....	.....	.15	.25	.03	.....	.....	3.12
.....	T.	.18	.20	.....	.25	.10	.15	.20	.05	.02	T.	.17	.10	T.	.....	.....	2.31
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.29
.....	T.	.07	.36	.07	.04	.37	.20	.16	.11	.01	.01	.05	.08	.08	.01	.....	2.54
.....	T.	.12	.16	.....	.02	.22	.36	.24	.14	.....	.....	.18	.18	.19	.10	.....	3.06
.....
.....	T.	.12	.58	.12	.07	.42	.43	.12	.25	.13	.12	.14	.13	.15	.06	.....	4.06
.....	T.	.24	.71	.....	.20	.20	.30	.40	.20	.10	.....	.20	.10	.20	.10	.....	4.29
.....	.....	T.	.....	.....	.....	.33	.....	T.	.....	.06	.....	.....	.48	.....	.....	.....	1.40
.....	T.	T.	.05	.....	.33	T.	T.	T.	.06	.....	T.	.....	.30	.04	T.	T.	1.32
.....	T.	.09	.21	.....	T.	.89	.20	T.	T.	.09	.21	T.	T.	T.	.....	.....	2.48
.....	.....	T.	.07	.08	T.	.18	T.	.36	T.	T.	.....	.....	.80	T.	.....	.....	1.97
.....	T.	.....	.10	.....	T.	.20	.20	.10	T.	T.	.....	.20	T.	.....	.....	.....	1.40
.....	.....	T.	.30	.....	T.	.10	.05	.10	T.	.....	.....	T.	.80	.40	T.	.....	1.87
.....
.....	.....	T.	.05	T.	.30	.....	.05	.15	T.	.....	.....	.30	.40	T.	.....	.....	1.85
.....	.....	.01	T.	.....	.15	.38	.06	.....	.....	.....	.....	.14	.14	.....	.....	.....	1.54
.....	.....	.13	.....	.....	.32	.....	.09	.03	.04	.07	.03	.07	.17	.04	.....	.....	1.72
.....	.....	T.	.....	.....	.18	.17	.08	.08	.....	T.	.15	T.	.20	.08	T.	.....	1.56
.....	T.	.24	.10	.....	.40	T.	.20	T.	.05	.....	.....	.50	T.	T.	.....	.....	2.31
.....	.....	.06	.23	.03	.18	.20	.15	.20	.21	.09	.04	.05	.17	.09	T.	.....	2.70
.....
0.01	T.	0.07	0.02	0.02	0.10	0.23	0.07	0.05	0.03	0.01	0.02	0.15	0.43	0.06	T.	T.	1.70
.....	T.	T.	T.	T.	.02	.02	.09	.15	.10	T.	.....	.15	.20	.10	.02	.....	1.45
.....	T.	.....	T.	.02	.03	.08	.04	.04	T.	.....	.....	.10	.30	.04	T.	T.	1.11
.....	T.	T.	.02	.08	.10	.18	.25	.20	T.	T.	T.	T.	.50	T.	T.	.....	1.76
.....	.....	.....	.09	.13	.....	.27	.16	.19	.10	.15	.22	.09	.26	.37	.....	.....	2.68
.....
.....	.....	.38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.56	.....	.....	.....	0.94
.....	T.	.....	.....	.....	.02	.....	.....	.....	.....	.....	.....	.....	1.10	.....	.....	.....	.....
.....	.08	.06	.26	.....	.....	1.40	.....	.06	.....	.....	.....	.....	.44	.19	.....	.....	2.91
.....	.03	.....	.....	.....	.05	.43	.....	.02	.....	.....	.....	.....	.47	.....	.....	.....	1.13
.....	.....	.25	T.	.....	.35	.....	.22	.05	.....	.....	.....	.....	.63	.....	.....	.....	1.72
.....	.....	T.	.....	.....	.....	.09	.....	.05	.39	.02	.01	1.29	*	+1.15	.....	.....	3.15
.....	.....	.....	.09	.....	.....	.24	.09	.....	.....	.....	.....	.....	.34	.05	.....	.....	1.14
.....	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....	.....	.61	.....	.....	.....	1.22
.....	.....	.03	T.	.13	.05	.28	.08	.07	.06	.....	.....	.10	.32	T.	.....	.....	1.81
.....	.....	T.	.01	.....	.35	.....	.05	.05	.....	.....	.....	.29	.10	T.	.....	.....	1.25
.....	T.	.....	.01	.05	.....	.20	.10	.10	T.	T.	.....	.30	.30	.05	.....	.....	1.31
.....	.....	.03	T.	.....	.22	.33	.01	.....	.....	T.	.....	.18	.20	.....	.....	.....	1.72
.....	.....	*	+ .35	.....	*	+ .52	.....	.....	.....	.....	.....	.....	.67	.....	.....	.....	1.89
0.01	T.	0.19	0.10	0.00	0.15	0.41	0.24	0.16	0.01	0.03	0.38	0.20	0.46	0.01	0.00	T.	2.93
.....	T.	.10	.05	.....	*	+ .14	.16	.01	T.	.19	.09	.30	.72	.....	.....	.....	2.48
.....	.05	T.	.32	.20	.....	.08	.51	.25	.10	.03	.02	.10	.04	.45	T.	.....	2.48
.....	T.	T.	.....	.....	.51	.03	.36	.03	.02	.02	.30	.10	.21	.....	T.	.....	1.97
.....	.....	.....	.10	.....	.....	.80	.50	.....	.....	.....	1.80	.40	.30	.....	.....	.....	5.50
.....	.....	.21	.30	.....	.....	.50	.20	.26	.....	.....	.36	.04	.29	.08	.....	.....	2.72
.....	T.	.25	.07	.....	.....	.30	.....	.70	.....	.....	.....	.55	.65	.....	.....	.....	3.15
.....	.....	.45	.....	.....	.20	.30	.20	.....	.....	.....	.....	.....	.60	.....	.....	.....	2.20
.....
T.	T.	0.09	0.06	?	0.30	1.09	0.04	T.	0.03	0.00	?	0.21	0.87	0.05	0.00	0.00	3.68
.....	T.	*	+ .13	.....	*	+2.05	.04	.....	.10	.....	.....	*	+ .98	.....	.....	.....	4.14
.....	T.	.....	.10	.....	.....	.54	.....	.....	T.	.....	.....	*	+1.20	.40	.....	.....	2.82
.....	T.	T.	.05	.06	.....	.07	1.71	.04	.....	.09	.....	.....	.01	.99	.....	.....	3.51
.....	.....	.30	.....	.....	1.60	.....	T.	.....	T.	.....	*	+ .74	.10	.....	.....	.....	3.54

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Brentwood.....				*	1.00						T.			T.
Setauket.....				T.	.37	T.					T.			T.
Bedford.....			.01	.08	.63	T.					T.			.03
Primrose.....				.64	.10	T.					T.			T.
<i>Hudson Valley.....</i>	0.00	0.00	T.	0.08	0.43	0.01	T.	0.00	0.00	T.	0.01	T.	?	0.05
Albany.....				T.	.36	.62	T.			T.	T.	T.		
Lebanon Springs.....				*	*	1.17				T.	*	1.02		
Honeyhead Brook.....				T.	.70	.27					.05			.05
Poughkeepsie.....					.46						.03			.05
Wappinger's Falls.....				.04	.38						.05			.04
Catskill.....				.48	T.						T.			
West Point.....				.40	.10									.35
Boyd's Corners.....														
Carmel.....					.94								*	1.05
Southeast Reserv'r.....														
Eagle Mills.....					.15									
Easton.....					.74									
<i>Mohawk Valley.....</i>	0.00	0.00	0.00	0.08	0.09	0.08	0.01	0.00	0.00	0.07	0.11	0.03	0.00	0.00
Little Falls (1).....				T.	.18	.03				.04	.07			
Canajoharie.....					.06	.01					T.	.03		
St. Johnsville.....					.11	.04	.04			.03		.10		
Rome.....				.30		.24				.22	.37			
<i>Champlain Valley.....</i>	0.00	T.	0.00	T.	0.32	0.07	T.	0.00	0.00	0.06	0.03	T.	0.00	0.00
Plattsburgh Barracks.....		T.			.27	.21	T.			.17	.06	T.		
Glen's Falls.....					.40						T.			
Lake George.....				T.	.29	T.				T.	.03			
<i>St. Lawrence Val.....</i>	0.02	0.00	0.00	0.01	0.14	0.14	0.00	T.	0.01	0.01	0.05	0.00	0.00	0.00
Madison Barracks.....										.05	.09			
Water own.....		T.			.44	.30		.01			.12			
Canton.....														
DeKalb Junction.....						.30			.05	.03				
North Hammond.....	.10			.04	.03	T.				T.				
Ogdensburg.....					.10	.05					.10			
Potsdam.....					.30	.20				T.				
<i>Great Lakes.....</i>	T.	T.	T.	0.21	0.22	0.19	0.06	T.	T.	0.13	0.25	0.10	T.	T.
Westfield.....				T.	.32	T.					.40			
Buffalo.....	.01			.22	.03	1.15	T.	T.	T.	T.	.25	T.		
Adams Centre.....				.46		.49				.01	.03	.02		
Pittsford.....				.33	.22	.04	T.			T.	.03	.04		
Rochester.....	T.	T.		.32	.24	.03	.05		T.	.01	.09	.06	.03	
Scottsville.....														
Appleton.....	T.	.07		.19	.05	T.	.01		T.	.02	.02		T.	T.
Fort Niagara.....	.06			.10	.06						*	1.03		
Niagara Falls.....	T.			.16	.05									
Baldwinsville.....	T.		T.	.51	.15	.89	T.		.05	.40	T.			
Skaneateles.....					.55	.05					.17			
Ridgeway.....				.16	.03	T.							T.	
Demster.....					.30					1.00	.28			
Fulton.....					.07	.40				1.00	.20	.08		
Oswego.....	T.	T.		.17	.52	.06	.17		T.	.11	1.27	.02		
Palermo.....	T.			.05	.40	.02	.15			.20	1.05	1.00		
Phoenix.....					.67	.03	.26					.40		
Lyons.....			T.	.82	T.	T.				.10	.30	T.		
Rose.....				.19	.58	.20				T.	T.	.20	T.	
Erie, Pennsylvania.....	T.			.25	.38	.10	.02			T.	.06	.06		

TATION FOR JANUARY — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.....	.....	*	*	*	*	+1.50	.05	.....	.05	.....	.....	*	+1.80	.....	.....	.....	4.40
.....	.....	T.	.08	.....	.05	1.25	.06	.....	.02	.....	.....	.02	2.00	.....	.....	.....	3.85
.....	.....	.03	.14	.....	.06	1.51	0.14	.03	.01	.....	.....	.....	1.26	.....	.....	.....	3.92
T.	.....	.17	T.	.....	T.	1.55	T.	.....	T.	.....	.....	.80	.....	.....	.....	.....	3.26
0.01	0.04	0.10	0.04	0.00	0.09	0.42	0.03	0.04	T.	T.	T.	T.	0.76	0.08	0.00	0.00	2.61
.02	T.	.01	.02	.....	T.	.22	T.	T.	T.	T.	T.	.01	.96	.....	.....	.....	1.62
T.	.....	*	+44	.....	.....	.52	.....	.18	T.	.01	T.	.....	.78	.27	.....	.....	2.99
.....	.....	.12	.15	.....	.41	.01	.10	T.	.....	.....	.....	T.	.50	.....	.....	.....	2.36
.02	.....	.23	T.	.....	.13	.....	T.	.....	.....	.....	.....	.....	.70	.....	.....	.....	1.62
.....	.....	.01	.18	.....	.20	.62	.10	.12	T.	.....	.....	T.	.95	.65	.....	.....	2.77
.05	.....	.45	.....	.....	.....	.80	T.	.....	.....	.....	.....	.....	.50	.....	.....	.....	2.68
.....	.....	.....	.....	.....	.....	1.25	.....	.05	.....	.....	.....	.....	.50	.40	.....	.....	3.05
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.07
.....	.....	*	+53	.....	*	+84	.09	.....	.....	.....	.....	.....	1.00	.....	.....	.....	3.45
.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	.....	.30	.10	.....	.....	3.55
.....	.43	.....	.....	.....	.....	.28	.....	.09	.....	.....	.....	.....	.....	.....	.....	.....	0.60
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.51
0.01	0.00	0.02	0.04	0.00	0.04	0.12	0.11	0.08	0.07	0.12	0.06	0.09	0.26	0.00	0.00	0.00	1.48
.01	.....	.05	.02	.....	.16	.01	.09	.64	.....	.09	.02	.11	.69	.....	.....	.....	1.01
.....	.....	.08	.....	.....	T.	.25	.....	.....	.....	.....	.....	.....	.25	.....	.....	.....	0.69
.04	.....	.01	.04	.....	.....	.09	.05	.07	.04	.02	.10	T.	.36	.....	.....	.....	1.14
.....	.....	.....	.....	.....	.....	.13	.31	.20	.24	.39	.12	.26	.32	.....	.....	.....	3.10
T.	0.00	0.08	0.10	0.00	T.	0.56	0.07	0.09	T.	T.	0.00	0.00	0.56	0.45	0.00	0.00	2.51
T.	.....	.....	.01	.....	.....	.34	.12	.27	.....	.....	.....	.....	.16	1.37	.....	.....	2.98
T.	.....	*	+29	.....	*	+76	.10	.....	T.	.....	.....	.....	.82	.....	.....	.....	2.37
.....	.....	.17	.20	.....	T.	.19	T.	.....	T.	T.	.....	.....	.71	.....	.....	.....	2.19
0.00	0.00	0.10	0.01	0.00	0.09	0.46	0.09	0.19	T.	0.14	0.08	0.06	0.33	0.02	0.00	0.00	2.01
.....	.....	.....	.....	.....	.24	.02	.10	.01	.62	.....	.....	.....	.76	.....	.....	.....	1.29
.....	.....	.28	.....	.....	.28	.22	.21	.01	.01	.....	.12	.05	.30	.11	.....	.....	2.46
.....
.....	.....	.10	.05	.....	T.	.65	.04	.12	.....	.72	.26	.....	.15	.....	.....	.....	2.47
.....	.....	.....	.....	.....	T.	.60	.10	.20	.....	.10	.05	.....	.25	.....	.....	.....	1.47
.....	.....	.25	T.	.....	.....	.60	*	+30	.....	.....	.05	.....	.20	.....	.....	.....	1.65
.....	.....	.....	.....	.....	.....	.70	.....	.60	.....	.....	.....	.30	*	+60	.....	.....	2.70
T.	0.01	0.06	0.06	0.01	0.12	0.27	0.16	0.15	0.34	0.15	0.10	0.04	0.28	0.11	T.	0.00	3.02
.....	.....	.26	.....	.....	T.	.10	.....	.20	.30	.35	.....	.....	.....	.....	.....	.....	1.93
.....	.01	.16	.08	.01	.10	.62	.16	.62	T.	.....	T.	.03	.48	.27	T.	.....	3.60
.....	.....	.19	.06	.....	.....	.08	.....	.04	.....	.09	.04	.02	.....	.....	.....	.....	1.53
.....	T.	.01	.....	.....	.10	.24	.25	.02	T.	.....	.....	.....	.10	.11	.14	.....	1.83
.....	T.	.01	.10	.12	.10	.26	.24	.23	.09	T.	T.	.....	.11	.20	.16	.02	2.47
.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	T.	.04	.06	.02	.09	.29	.17	.07	.10	.04	T.	.....	.06	.09	.03	.....	1.42
.....	.....	.09	.03	.....	.32	.10	.03	.....	.04	.....	.....	*	*	+10	.....	.....	0.96
.....	.....	.18	.....	.....	.50	.67	.11	.....	.....	.....	.....	.....	.80	.....	.....	.....	1.87
.....	.....	.....	T.	.....	.26	.05	.30	.30	1.20	.....	.20	.....	1.60	.20	.....	.....	5.40
.....	.....	.....	.03	.05	.06	.15	.17	.10	.02	.....	.....	.15	.21	.06	.....	.....	1.77
.....	T.	.03	.11	.01	.04	.38	.15	.02	0.5	.01	.....	T.	.07	.04	.....	.....	1.10
.....	.....	.12	.....	.....	.....	.48	.12	.30	1.40	.....	.48	.....	.24	.24	.....	.....	4.96
.....	T.	T.	T.	.....	.....	.03	.30	.30	.40	.80	.01	T.	.36	.06	.....	.....	4.41
T.	T.	.06	.01	.01	.13	.65	.12	.27	1.20	.50	.30	.01	.39	.01	.....	.....	6.05
.....	.....	.05	T.	T.	.05	.50	.30	.70	.90	.20	.80	T.	.30	.10	.....	.....	6.78
.....	.....	.....	.03	.....	.....	.60	T.	.26	T.	.83	.11	.....	.18	.46	.....	.....	3.83
.....	T.	T.	.15	.....	.40	.....	.20	.....	T.	.....	T.	.....	.20	.....	.....	.....	2.27
.....	.....	T.	.05	T.	.07	.24	.25	.10	.30	.05	.....	.05	.20	.15	.05	.....	2.68
.....	T.	.03	.27	.01	.06	.23	.17	.09	.39	.06	.05	.11	.09	.14	T.	.....	2.57

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.00	0.00	0.00	0.29	0.39	0.01	0.00	0.00	T.	0.02	0.06	0.05	0.00	0.00
<i>Fleming</i>.....				.30	.20						.20	.20		
<i>Sherwood</i>.....				.82		.01				.06				
<i>Watkins</i>.....					.57									
<i>Romulus</i>				T.	.60				T.		T.			
<i>Ithaca</i>.....				.05	.57					T.	.02	T.		
Average	T.	T.	T.	0.13	0.28	0.08	0.02	T.	T.	0.04	0.07	0.02	T.	0.01

‡ Re for the month incomplete. || Received too late to be included in the averages.

TATION FOR JANUARY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	0.00	T.	0.02	0.01	0.12	0.23	0.16	0.02	0.00	0.04	0.15	0.03	0.17	0.04	T.	0.00	1.68
.....	.....	.....	.....	.....	.....	.30	.30	.....	.....	.....	.....	.....	.40	.....	.....	.....	1.90
.....	.....	.02	.....	.....	.....	.30	.....	.10	.08	.....	.17	.60	.....	.....	.15	.....	2.34
.....	.....	.....	.....	.....	.....	.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	T.	.....	.....	.12	.13	.12	.....	.....	.....	T.	.....	.....	T.	.....	0.97
T.	.....	T.	.10	.05	.06	.15	.10	T.	.....	T.	.....	.12	.28	T.	T.	.....	1.50
T.	T.	0.08	0.06	0.01	0.13	0.40	0.11	0.09	0.06	0.05	0.08	0.09	0.43	0.09	T.	T.	2.39

*Amount included in next measurement.

† Not included in computing averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE DEGREES (FAHR.).									
		Normal for the month of January.	Length of record, years.	Record begins.	Record ends.	Mean for January, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR JANUARY.			
								Highest.	Year.	Lowest.	Year.
<hr/>											
<i>Western Plateau</i>		23.0	..	.....	.....	21.8	-1.2	.....	.....	.....	.....
Angelica.....	Allegany.....	21.2	14	1855	1897	19.2	-2.0	31.9	1890	12.0	1857
Humphrey.....	Cattaraugus.....	22.5	14	1884	1897	21.6	-0.9	34.2	1890	15.9	1893
Elmira.....	Chemung.....	25.3	19	1851	1897	24.7	-0.6	35.6	1890	13.4	1857
<hr/>											
<i>Eastern Plateau</i>		22.3	..	.....	.....	22.4	+0.2	.....	.....	.....	.....
Oxford.....	Chenango.....	22.8	30	1828	1897	22.6	-0.2	29.6	1828	13.5	1856
Cortland.....	Cortland.....	22.8	34	1829	1897	21.4	-1.4	30.3	1843	9.3	1857
Cooperstown.....	Otsego.....	20.3	44	1854	1897	21.6	+1.3	31.6	1880	10.3	1857
Waverly.....	Tioga.....	23.2	15	1883	1897	24.2	+1.0	33.5	1890	17.2	1893
<hr/>											
<i>Northern Plateau</i>		19.1	..	.....	.....	18.4	-0.7	.....	.....	.....	.....
Lowville.....	Lewis.....	19.1	31	1827	1897	18.4	-0.7	28.9	1843	5.4	1857
<hr/>											
<i>Atlantic Coast</i>		30.4	..	.....	.....	29.6	-0.8	.....	.....	.....	.....
New York City.....	New York.....	30.3	27	1871	1897	29.0	-1.3	40.0	1890	23.3	1893
Setauket.....	Suffolk.....	30.4	12	1886	1897	30.2	-0.2	38.8	1890	22.5	1893
<hr/>											
<i>Hudson Valley</i>		24.6	..	.....	.....	25.2	+0.6	.....	.....	.....	.....
Albany.....	Albany.....	23.1	24	1874	1897	25.0	+1.9	30.8	1880	14.6	1875
Honey-mead Brook...	Dutchess.....	22.9	17	1881	1897	24.4	+1.5	32.4	1890	15.8	1893
West Point.....	Orange.....	27.7	68	1826	1897	26.2	-1.5	40.1	1870	19.1	44-57
<hr/>											
<i>Champlain Valley</i> ...		16.8	..	.....	.....	16.6	-0.2	.....	.....	.....	.....
Plattsburgh Barracks	Clinton.....	16.8	44	1839	1897	16.6	-0.2	27.4	1880	9.7	75-84
<hr/>											
<i>St. Lawrence Valley</i> ...		18.3	..	.....	.....	18.7	-0.1	.....	.....	.....	.....
Madison Barracks...	Jefferson.....	19.7	39	1839	1897	19.4	-0.3	32.2	1880	10.4	1888
Canton.....	St. Lawrence.....	16.9	34	1862	1896	.....	.....	29.3	1888	7.2	1875
North Hammond.....	".....	18.7	19	1867	1897	20.1	+1.4	27.4	1889	6.7	1875
Potsdam.....	".....	17.9	29	1828	1897	16.6	-1.3	27.6	1843	8.2	1893
<hr/>											
<i>Great Lakes</i>		24.3	..	.....	.....	23.6	-0.7	.....	.....	.....	.....
Buffalo.....	Erie.....	24.5	27	1871	1897	25.0	+0.5	35.8	1880	16.8	1882
Rochester.....	Monroe.....	24.0	27	1871	1897	24.0	0.0	36.5	1880	17.0	1893
Fort Niagara.....	Niagara.....	25.8	42	1842	1897	26.0	+0.2	36.4	1880	18.7	1875
Baldwinsville.....	Onondaga.....	22.2	22	1851	1897	22.4	+0.2	30.2	1858	13.2	1857
Oswego.....	Oswego.....	24.1	27	1871	1897	23.0	+1.1	36.2	1880	15.4	1888
Palermo.....	".....	22.2	44	1854	1897	20.6	-1.6	.....	.....	.....	.....
Erie, Pennsylvania..	Erie.....	27.0	24	1874	1897	24.0	-3.0	29.4 63, 80, 90	1880	11.6	1888
<hr/>											
<i>Central Lakes</i>		24.1	..	.....	.....	23.7	-0.4	.....	.....	.....	.....
Ithaca.....	Tompkins.....	24.1	19	1879	1897	23.7	-0.4	34.7	1880	17.5	1893
<hr/>											
Average departure		.....	.....	.....	.....	.....	-0.3	.....	.....	.....	.....

AND PRECIPITATION — JANUARY.

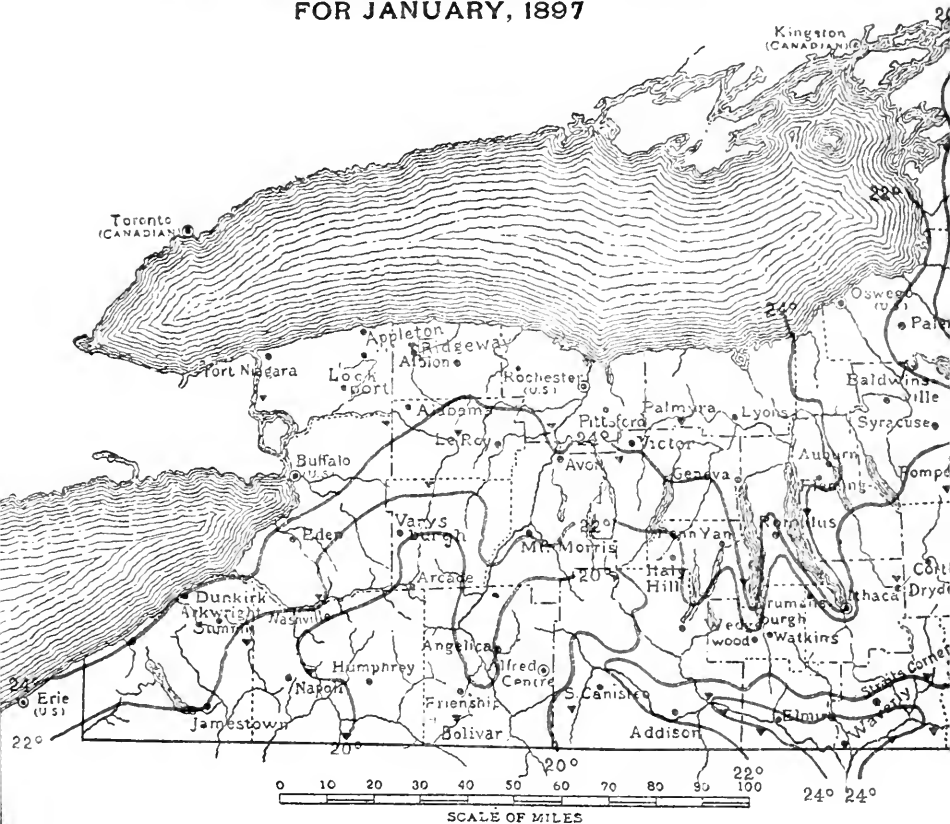
STATION.	COUNTY.	PRECIPITATION — (INCHES.)									
		Average for the month of January.	Length of record, years.	Record begins	Record ends.	Total for January, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR JANUARY.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau</i>		2.75	..	.....	.....	2.53	-0.23	.....	.....	.....	.....
Angelica	Allegany	2.94	13	1856	1897	3.12	+0.18	4.45	1874	1.86	1891
Humphrey	Cattaraugus ..	3.14	14	1884	1897	3.06	-0.08	5.02	1890	1.82	1891
Elmira	Chemung	2.18	16	1854	1897	1.40	-0.78	4.72	1856	0.62	1893
<i>Eastern Plateau</i>		2.73	..	.....	.....	2.16	-0.57	.....	.....	.....	.....
Oxford	Chenango	2.50	27	1829	1897	1.76	-0.74	5.11	1836	0.92	1834
Cortland	Cortland	2.08	18	1851	1897	2.67	+0.60	5.02	1863	1.30	1851
Cooperstown	Otsego	2.56	44	1854	1897	1.72	-0.84	5.54	1891	0.32	1860
Port Jervis	Orange	3.62	14	1880	1897	2.91	-0.71	7.02	1891	1.55	1896
Waverly	Tioga	2.30	16	1882	1897	1.72	-0.58	3.99	1892	1.20	1887
<i>Northern Plateau</i>		2.51	..	.....	.....	2.72	+0.21	.....	.....	.....	.....
Lowville	Lewis	2.51	32	1827	1897	2.72	+0.21	4.81	1855	0.55	1842
<i>Atlantic Coast</i>		4.10	..	.....	.....	3.68	-0.42	.....	.....	.....	.....
New York City	New York	3.92	27	1871	1897	3.51	-0.41	6.15	1882	1.15	1871
Setauket	Suffolk	4.27	12	1886	1897	3.85	-0.42	6.29	1891	1.48	1896
<i>Hudson Valley</i>		3.40	..	.....	.....	2.54	-0.86	.....	.....	.....	.....
Albany	Albany	2.76	24	1874	1897	1.62	-1.14	6.12	1891	0.98	1896
Honeymead Brook	Dutchess	3.26	17	1851	1897	2.36	-0.90	6.89	1891	0.91	1896
Poughkeepsie	"	3.19	22	1830	1897	1.62	-1.57	6.65	1891	0.45	1849
West Point	Orange	3.59	50	1840	1897	3.05	-0.54	9.95	1841	0.82	1851
Boyd's Corners	Putnam	4.20	27	1870	1897	4.07	-0.13	9.76	1891	1.09	1896
<i>Champlain Valley</i>		1.83	..	.....	.....	2.98	+1.15	.....	.....	.....	.....
Plattsburg Barracks ..	Clinton	1.83	39	1840	1897	2.98	+1.15	4.30	1892	0.59	1888
<i>St. Lawrence Valley</i> ..		2.26	..	.....	.....	1.82	-0.44	.....	.....	.....	.....
Madison Barracks	Jefferson	2.24	37	1840	1897	1.29	-0.95	4.71	1874	0.20	1888
North Hammond	St. Lawrence ..	2.76	20	1866	1897	1.47	-1.29	5.94	1870	1.06	1896
Potsdam	"	1.78	28	1828	1897	2.70	+0.92	4.50	1895	0.36	1896
<i>Great Lakes</i>		2.83	..	.....	.....	3.74	+0.91	.....	.....	.....	.....
Buffalo	Erie	3.02	27	1871	1897	3.60	+0.58	5.61	1874	1.16	1871
Rochester	Monroe	3.13	27	1871	1897	2.47	-0.66	8.05	1878	0.94	1883
Fort Niagara	Niagara	1.99	39	1842	1897	0.96	-1.03	5.61	1843	0.53	1879
Oswego	Oswego	3.05	27	1871	1897	6.05	+3.00	6.43	1884	0.92	1887
Palermo	"	2.56	38	1860	1887	6.78	+4.22	6.50	1874	0.16	1834
Erie, Pennsylvania	Erie	3.21	24	1874	1897	2.57	-0.64	6.20	1878	1.41	1875
<i>Central Lakes</i>		2.17	..	.....	.....	1.50	-0.67	.....	.....	.....	.....
Ithaca	Tompkins	2.17	19	1879	1897	1.50	-0.67	3.73	1892	0.57	1879
Average departure ..		—	—	—	—	—	-0.14	—	—	—	—

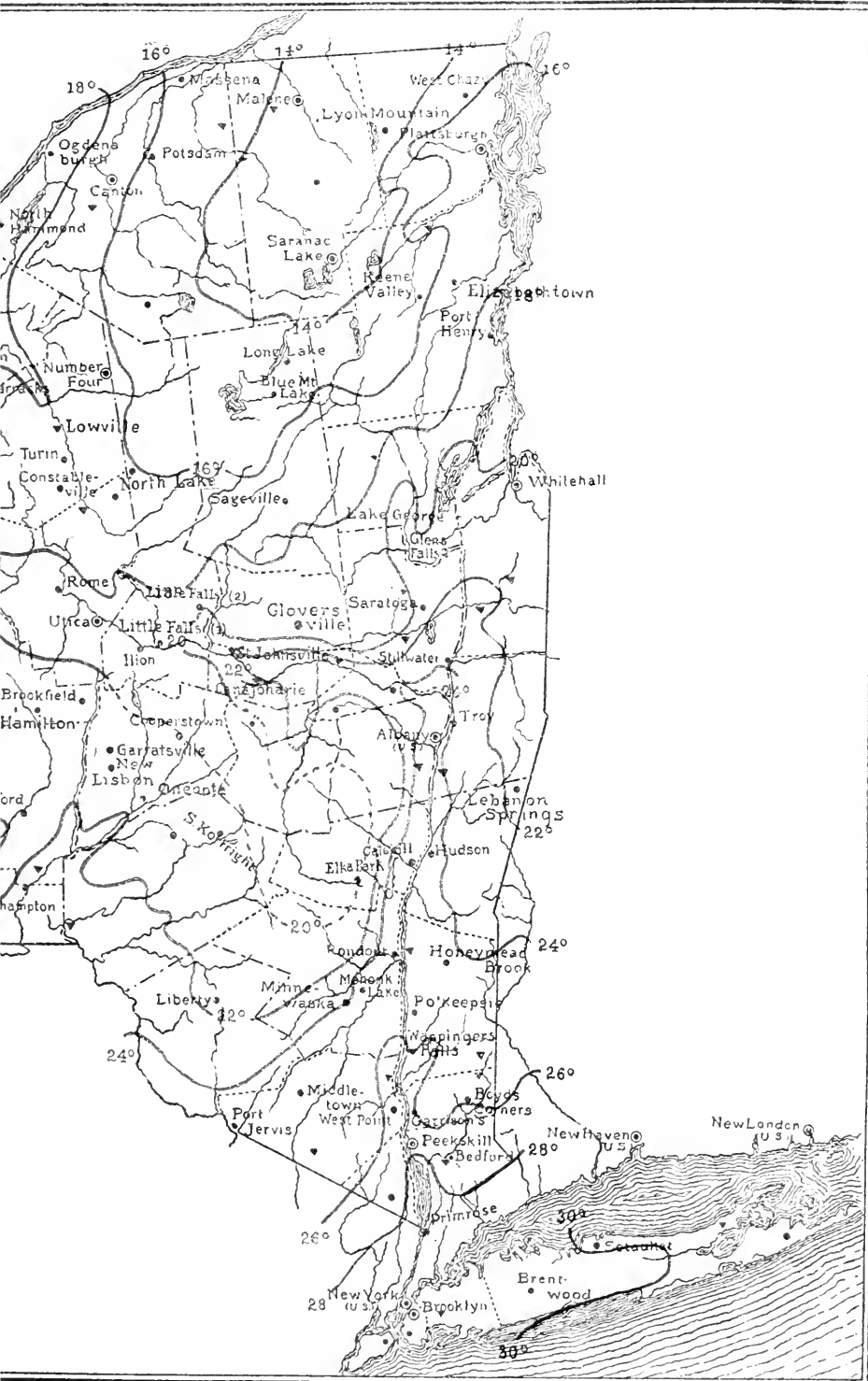
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR JANUARY, 1897





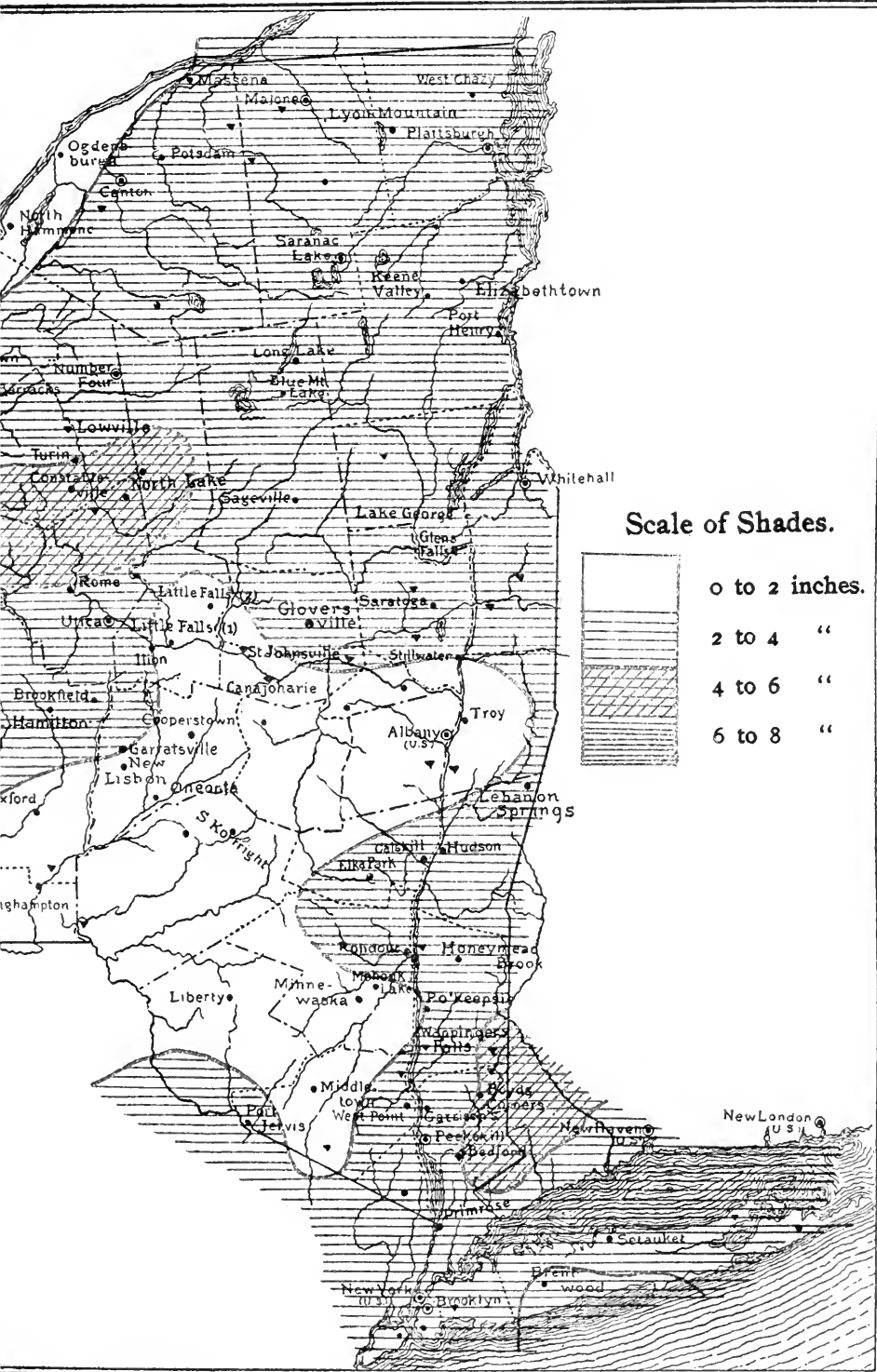
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR JANUARY, 1897





Meteorological Summary for February, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during February was 30.09 inches. The highest barometer was 30.74 inches at Friendship and Ithaca on the 28th, and the lowest 29.55 inches at Erie, Pa., on the 6th and at Ithaca on the 23d. The mean pressure was highest in the eastern-central section, and lowest near the lakes. The average pressure at 6 stations of the National Bureau was 0.01 inch below the normal, an excess occurring only at Albany.

The mean temperature of the State, as derived from the records of 78 stations, was 24.6 degrees. The highest local mean was 33.2 degrees at Brooklyn, and the lowest, 17.5 degrees, at Saranac Lake. The highest general daily mean was 37 degrees on the 7th, the lowest being 13 degrees on the 27th. The maximum temperature reported was 56 degrees at Primrose, Westchester county, on the 21st, and the minimum, 28 degrees below zero, at Saranac Lake on the 28th. The mean monthly range of temperature for the State was 50 degrees; the greatest local range being 78 degrees at Saranac Lake, and the least, 35 degrees, at Brooklyn. The mean daily range was 17 degrees. The greatest local daily range was 60 degrees at Saranac Lake on the 5th, and the least, 0 degree, at Primrose, on the 22d. The mean temperatures of the various regions were as follows: The Western Plateau, 26.6 degrees; the Eastern Plateau, 25 degrees; the Northern Plateau, 20.1 degrees; the Atlantic coast, 31.1 degrees; the Hudson valley, 26.2 degrees; the Mohawk valley, 22.9 degrees; the Champlain valley, 20.5 degrees; the St. Lawrence

Valley, 20 degrees; the Great Lakes, 26.6 degrees; the Central Lakes, 27.2 degrees. The average of the mean temperature at 26 stations possessing records for previous years was 1.4 degrees above the normal, the values being in excess at all stations excepting West Point, Plattsburgh and Madison Barracks.

The mean relative humidity for the State was 77 per cent. The mean dew point was 20 degrees.

The average precipitation for this State was 1.86 inches of rain and melted snow, as derived from the records of 100 stations. The amounts exceeded 2 inches over portions of western, northern and southeastern New York, while over a considerable area of the central section the total was less than 1 inch. The maximum local precipitation was 4.68 inches at Willets Point, and the least, 0.59 inches, at Dryden. The average total snowfall, at 69 widely distributed stations, was 11.2 inches. The least amount was about 5 inches in portions of western and central New York, while in other portions of the State more than 11 inches were generally reported. The maximum local amount was 28 inches at Potsdam. The average total precipitation at 27 stations possessing records for previous years was 0.61 inch below the normal amount, excesses occurring only at Potsdam, Buffalo and Poughkeepsie. The deficiency was most marked on the Atlantic coast, and least in the St. Lawrence Valley.

The average number of days on which the precipitation amounted to 0.01 inch or more was 8.2; the storm frequency being greatest in western and northern New York, and least in the vicinity of the Central Lakes and Champlain Valley. The average number of clear days was 8.0; of partly cloudy days, 8.6, and of cloudy days, 11.4, giving an average cloudiness of 56 per cent. for the State. The cloudiness was least in eastern New York, and greatest in the northern section and the vicinity of the Great Lakes.

The prevailing winds were from the northwest. The average total wind travel at 6 stations of the National Bureau was 8,321 miles; the maximum velocity being 60 miles per hour at New York City on the 6th. The wind travel was generally in excess of the usual mileage, both on the sea-coast and in the interior.

A thunderstorm of moderate intensity was reported from Gloversville on the 20th.

Hail fell on the 2d, 5th, 12th, 15th, 20th and 22d, and sleet on the 5th, 6th, 8th, 12th, 15th, 16th, 20th, 22d and 23d.

Solar halos were observed on the 9th and 10th, and lunar halos on the 9th, 10th, 14th, 17th and 20th.

GENERAL FEATURES OF THE WEATHER.

The average temperature for February was somewhat above the normal, cold periods at the beginning, near the middle and at the close of the month, being more than balanced by the mild weather which occurred between the 5th and 11th, and during much of the time from the 15th to the 24th. The excess of warm mean daily temperature amounted to 15 degrees on the 7th, this being the only large departure from the normal which occurred during the month.

The total precipitation was very deficient over the greater part of the State, the snowfall also being light, especially in the valleys of the central and western sections, where the ground was bare during the greater part of the month. The cloudiness was below the usual average for the winter months, the first week and also the last ten days being generally pleasant.

Eight areas, each of high and low pressure, influenced our weather during February; the number of depressions being less than the usual frequency for the month. In general, both high and low areas followed a more southerly course than in January, more than half of the depressions passing over or to the south of this State. No

exceptionally low pressures were registered in this vicinity, and the highs were also of moderate intensity, with the exception of the first and the last of the series. The following is a brief account of the pressure systems of the month :

High I, 30.6 inches over New York on the 1st. Fair and cold weather on the 1st and 2d.

Low I, a severe storm passing northward along the coast, giving dangerous gales, rain and snow in the eastern section.

High II, 30.5 inches, passing from the Upper Lakes over the Northeastern States and coast on the 4th to 6th. Fair, cold weather followed by rising temperatures reaching the maximum of the month in advance of

Low II, 29.6, passing from the Southern States over southeastern New York on the 6th to 8th, with rain, hail and snow, mainly on the coast and lakes.

High III, a large area 30.7 inches, near the Upper Lakes on the 10th, much colder in New York. Cold continued until the 14th, as the area moved to the northeast coast.

Low III, 29.6 inches, developed and dissipated southwest of New York on the 12th to 13th, when the heaviest snows of the month occurred in southeastern New York.

Low IV, 29.7 inches, passed south of New York to the coast on the 16th. Rain, hail and sleet on the coast, snow in the western section.

High IV over the Southern States on 17th and 18th, rising temperatures in New York, in conjunction with

Low V, 29.5 inches, passing eastward over Canada on the 18th. Light rain in the western section.

High V, 30.5 inches, passed from the Central States and Lakes to the northern coast on the 20th, giving fair and colder weather.

Low VI, 29.6 inches passed from the Northwestern States to the Canadian coast on the 20th to 22d. Warmer, rain in eastern New York, high winds on the lakes.

High VI, 30.3 inches passed over Canada on the 22d. Slightly colder.

Low VII, 29.4 inches, moved from Texas to Michigan, and thence over the Northeastern States to the coast on the 23d, giving the maximum wind velocities of the month along the lakes, with rain, snow and sleet.

High VII, 30.3 inches, passed from the Western to the Southeastern States on the 27th and 28th, maintaining mild weather in New York in conjunction with

Low VIII, 29.9 inches, over Canada on the 25th and 26th. Light snows.

High VIII, 30.7. A large area over the Central and Gulf States on the 27th, spreading northward along the coast on the 28th. The coldest weather of the month prevailed from the 26th to 28th.

NOTES. Robins were observed at Humphrey on the 17th.

Distinct earthquake shocks were noted at Potsdam, at 11:03 P. M., and at midnight of the 9th. Canton reports slight earth tremors at 11 P. M.

The observer at Perry City states that wheat was protected only a short time by snow this month, and that stock wintered well. Ice was gathered 18 to 20 inches thick.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
<i>Western Plateau.</i>														
Alfred	Allegany	1795									24.0	26.6	51	17
Angelica	"	1340									24.3	24.7	45	17
Bolivar	"	1800									25.7	25.7	46	17
Friendship	"	1550	30.11	30.74	28	29.57	6	1.17			26.8	26.8	48	17
<i>Franklinville.</i>														
Franklinville	Cattaraugus	1598									24.3	24.3	44	17
Humphrey	"	1950									26.1	26.8	48	17
<i>Arkwright</i>														
Arkwright	Chautauqua	1260									26.4	26.4	43	17
Jamestown	"	1324									28.2	28.2	45	17
Elmira	Chemung	863									28.8	28.8	51	17
<i>Avon</i>														
Avon	Livingston	585									26.0	26.0	43	b
<i>Mt. Morris.</i>														
Mt. Morris	"	525									28.1	28.8	46	17
<i>Lockport</i>														
Lockport	Niagara	630									28.1	28.8	46	17
<i>Victor.</i>														
Victor	Ontario													
<i>Wedgewood</i>														
Wedgewood	Schuyler	1350									24.8	26.4	51	17
Addison	Steuben	1000									27.4	27.9	50	17
South Canisteo	"	1480							79	20	25.2	26.8	50	17
Arcade	Wyoming	1707									23.5	24.4	44	17
<i>Eastern Plateau.</i>														
Binghamton (1)	Broome	870									26.0	25.9	50	17
Binghamton (2)	"	875	30.15	30.64	1	29.66	6	0.98			26.0	26.0	50	17
Oxford	Chenango	550									26.2	26.2	47	17
Cortland	Cortland	1120									25.0	25.0	46	18
<i>South Kortright.</i>														
South Kortright	Delaware										23.2	23.2	46	17
<i>Brookfield</i>														
Brookfield	Madison	1350												
<i>Middletown.</i>														
Middletown	Orange	700									28.1	28.1	48	21
Port Jervis	"	470									22.3	21.3	44	17
Cooperstown	Otsego	1250									23.9	24.3	47	7
Garrattsville	Otsego										22.4	21.8	44	17
New Lisbon	"	1231									26.8	27.3	49	17
Oneonta	"	1100									23.8	23.6	49	17
Perry City	Schuyler	1038									23.3	23.3	44	14
<i>Straits Corners.</i>														
Straits Corners	Tioga										27.7	27.7	54	17
Waverly	"	825									24.6	24.6	43	c
Dryden	Tompkins										25.4	26.2	46	21
Mohonk Lake	Ulster	1245									20.1	20.1	50	5
<i>Northern Plateau.</i>														
Saranac Lake	Franklin										17.5	17.5	50	5
Gloversville	Fulton	850									23.0	23.0	41	7
Little Falls (2a)	Herkimer	1526									20.6	20.6	47	25
<i>North Lake.</i>														
North Lake	Herkimer										18.6	18.6	41	6
Lowville	Lewis	960									20.8	20.8	41	d
Number Four	"	1571	30.02	30.47	1	29.63	23	0.84			20.0	20.0	40	7
<i>Atlantic Coast.</i>														
Brooklyn	Kings										31.1	31.1	56	21
Manhattan Beach	"										33.2	33.2	52	21
New York City	New York	314	30.09	30.59	28	29.65	7	0.94	76		30.6	30.6	48	22
Willels Point	Queens										33.0	33.0	53	21
Brentwood	Suffolk	80									31.2	30.6	47	e
Setauket	Suffolk	40							75	23	31.2	31.2	47	21
Bedford	Westchester	290									29.7	29.7	51	21
Primrose	"	200									29.6	29.6	56	21

FOR FEBRUARY, 1897.

TURE — (IN DEGREES FAHR.)							SKY.		PRECIPITATION — (INCHES.)							Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	Duration.	Date.	Total snow fall.		
-8	1	47	15	47	1	3	9	6.1	7.5	14	8.5	1.54	1.06	h. m. 13.00	6-7	.....	.....
-1	26	44	15	26	14	1	3	3	6	19	17	1.67	0.52	.....	6	13.7	S. W.
-8	1	54	16	45	1	5	9	4	9	15	10	1.57	0.30	.....	6	7.0	.....
-5	1	51	16	42	1	4	7	5	5	18	9	1.44	0.50	.....	6	5.0	S. W.
-6	1	54	18	47	1	8	3	7	9	12	6	1.56	0.86	.....	6	4.8	W.
-7	1	51	16	44	1	5	10	5	10	13	18	2.01	1.06	13.00	6-7	4.4	S. W.
3	26	45	14	27	13	5	3	2	7	19	14	2.56	0.98	.....	6	12.5	S. W.
5	27	38	11	21	14	3	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	27	41	13	29	1	4	8	4	11	13	8	2.23	0.96	.....	6	11.0	N. W.
-1	1	52	14	41	14	5	19	11	1	16	2	0.93	0.65	.....	12	6.5	N. W.
2	1	41	14	38	5	6	y	7	9	12	4	0.64	0.44	.....	6	4.0	.....
6	27	40	14	26	5	4	7	5	3	17	3	1.00	0.50	.....	11-12	7.0	W.
6	27	40	14	26	5	4	7	5	12	11	5	2.70	1.00	.....	7	27.0	E.
4	j	47	18	38	14	7	7	6	12	10	5	0.87	0.50	.....	12	7.2	N. W.
-7	1	57	16	44	r	4	8	12	8	8	11	0.76	0.42	.....	11-12	5.0	N. W.
0	27	50	18	30	28	7	12	7	0	21	7	1.60	0.60	.....	6	13.0	N. W.
2	28	42	14	25	5	5	9	2	9	17	17	1.76	0.80	.....	6	9.5	.....
-13	1	52	18	57	14	3	20	7.5	9.7	10.8	6.9	1.75	1.22	22.00	6-7	.....	.....
-10	1	60	18	51	14	5	2	6	7	15	8	2.09	1.00	19.00	12	13.7	N. W.
-6	1	56	14	49	14	4	8	5	10	13	10	1.37	0.60	.....	12	.....	N. W.
-7	14	54	20	49	14	7	11	7	9	12	9	2.09	1.00	.....	12	12.5	N. W.
0	1	46	17	37	14	4	8	8	12	8	9	1.11	0.60	.....	13	.....	N.
-13	1	59	21	43	5	9	8	.....	.....	.....	3	1.53	0.70	13.00	23	.....	.....
-3	1	51	16	38	14	4	7	8	16	4	7	3.00	1.07	.....	7	14.5	S. W.
-10	14	54	17	47	14	4	8	11	7	10	8	2.06	1.10	.....	12	14.5	N.
1	14	46	18	40	14	6	8	12	7	9	3	1.43	1.20	.....	12	12.0	N.
-13	1	57	20	50	14	5	12	7	8	13	7	1.53	0.67	.....	12	10.5	N. W.
-4	1	53	19	47	14	8	8	.....	.....	.....	4	2.09	0.93	.....	12	.....	.....
-2	28	51	18	43	14	6	8	5	6	17	11	1.33	0.55	.....	12	11.1	N. W.
-3	1	47	21	46	14	3	20	12	9	7	9	1.39	1.00	19.00	12	12.0	N.
-9	1	63	20	57	14	5	8	4	13	11	7	1.67	0.65	.....	12	7.2	N. W.
2	1	41	16	38	14	5	8	.....	.....	.....	5	0.59	0.25	.....	12	.....	.....
10	k	36	12	27	1	4	12	5	12	11	3	3.02	1.22	22.00	6-7	11.0	N. E.
-28	28	59	22	60	5	3	8	6.6	7.2	14.2	11.7	2.04	0.60	.....	23	.....	.....
-24	28	78	27	60	5	9	15	8	8	12	10	1.50	0.30	.....	7	19.8	S. W.
-7	1	48	16	32	14	3	8	9	4	15	15	2.03	0.53	.....	23	11.6	N. E.
-19	28	66	25	50	25	9	15	8	2	18	12	1.62	0.45	20.00	12	13.0	W.
-20	27	61	26	50	1	7	16	.....	.....	.....	8	2.10	0.60	.....	23	20.0	W.
-9	26	50	19	44	14	5	8	4	16	8	12	1.75	0.29	.....	6	16.0	W.
-10	27	50	17	32	16	6	8	4	6	18	13	3.21	0.47	.....	12	27.2	W.
-6	1	44	15	46	1	0	22	10.2	7.4	10.4	8.1	2.87	1.50	.....	5	.....	.....
17	m	35	11	24	14	2	12	9	10	9	10	3.20	1.07	15.00	12	9.0	W.
12	14	36	11	20	x	4	13	13	1	14	9	2.42	0.70	.....	23	5.0	N. W.
17	27	36	11	21	21	7	aa	5	11	12	9	2.72	1.00	.....	12	8.8	N. W.
9	5	38	16	30	1	6	8	.....	.....	.....	8	4.68	1.50	.....	5	9.3	N.
0	n	54	19	42	14	4	22	16	3	9	8	2.08	0.70	8.00	6	12.8	N. W.
9	1	38	12	27	14	6	be	9	9	10	10	2.56	0.90	.....	12	10.0	W.
-4	1	55	19	46	1	6	22	10	10	8	7	3.09	1.31	16.20	12	15.3	W.
-6	1	62	18	41	r	6	22	10	8	10	4	2.24	1.05	.....	6	10.0	N. E.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA.				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees)	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
<i>Hudson Valley</i>														
Albany	Albany	97	30.12	30.68	28	29.62	23	1.06	78	20	...	26.2	54	21
Lebanon Springs	Columbia	930	...	...	...	...	...	...	...	...	...	26.0	48	21
Honeymead Brook	Dutchess	450	...	...	...	...	...	...	...	...	25.2	23.6	49	21
Poughkeepsie	"	180	...	...	...	...	...	...	...	...	...	25.2	47	21
Wappinger's Falls ..	Dutchess .....	...	...	...	...	...	...	...	...	...	...	27.2	54	21
Catskill	Greene	450	...	...	...	...	...	...	...	...	27.2	26.9	49	21
West Point	Orange	167	...	...	...	...	...	...	...	...	...	27.6	51	22
Carmel	Putnam	450	...	...	...	...	...	...	...	...	...	27.1	50	21
<i>Mohawk Valley</i>														
Little Falls (1a)	Herkimer	924	...	...	...	...	...	...	...	...	...	22.9	46	17
Cunajoharie	Montgomery .....	...	...	...	...	...	...	...	...	...	...	21.6	39	f
St. Johnsville	"	810	...	...	...	...	...	...	...	...	...	24.4	44	22
Rome	Oneida	445	...	...	...	...	...	...	...	...	...	25.3	44	22
			...	...	...	...	...	...	...	...	...	23.6	42	17
			...	...	...	...	...	...	...	...	...	22.2	46	17
<i>Champlain Valley</i> ..														
Plattsburgh Bar'cks ..	Clinton	125	...	...	...	...	...	...	...	...	...	20.5	51	21
Glens Falls	Warren	340	...	...	...	...	...	...	...	...	...	17.8	44	8
Lake George	"	350	...	...	...	...	...	...	86	18	20.9	21.1	51	21
<i>St. Lawrence Valley</i> ..														
Madison Barracks ..	Jefferson	266	...	...	...	...	...	...	...	...	...	20.0	45	h
Watertown	"	486	...	...	...	...	...	...	...	...	...	20.2	45	h
Canton	St. Lawrence ..	304	...	...	...	...	...	...	...	...	...	19.3	18.8	42 6
<i>North Hammond</i> ..	St. Lawrence ..	300	...	...	...	...	...	...	...	...	...	21.1	21.3	44 17
Ogdensburg ..	"	258	...	...	...	...	...	...	...	...	...	21.0	44	7
Potsdam	"	300	...	...	...	...	...	...	...	...	...	18.5	18.8	42 7
<i>Great Lakes</i>														
Westfield	Chautauqua ..	758	...	...	...	...	...	...	...	...	...	26.6	48	17
Buffalo	Erie	768	30.08	30.70	28	29.58	12	1.12	76	21	...	24.1	46	17
Pittsford	Monroe	502	...	...	...	...	...	...	...	...	...	28.0	45	22
Rochester	"	523	30.07	30.68	28	19.62	6	1.06	73	20	...	27.1	46	17
			...	...	...	...	...	...	...	...	...	27.0	46	17
<i>Appleton</i>	Niagara	301	...	...	...	...	...	...	...	...	...	26.6	43	17
Fort Niagara	"	263	...	...	...	...	...	...	...	...	...	27.6	44	22
Baldwinsville ..	Onondaga	390	...	...	...	...	...	...	...	...	...	25.9	46	17
Ridgeway	Orleans .....	...	...	...	...	...	...	...	...	...	...	26.1	43	17
<i>Oswego</i>	Oswego	335	30.08	30.69	28	29.63	23	1.06	78	19	...	25.0	45	17
Palmero	"	460	...	...	...	...	...	...	...	...	...	23.2	23.1	45 17
Lyons	Wayne	407	...	...	...	...	...	...	...	...	...	27.5	47	17
Erie, Pa	Erie	714	30.08	30.67	28	29.55	6	1.12	86	24	...	28.0	47	17
			...	...	...	...	...	...	...	...	...	28.0	47	17
<i>Central Lakes</i>														
Fleming	Cayuga	1000	...	...	...	...	...	...	...	...	...	27.2	50	17
			...	...	...	...	...	...	...	...	...	26.3	46.8	47 17
<i>Romulus</i>	Seneca	719	...	...	...	...	...	...	...	...	...	27.8	50	17
Ithaca ..	Tompkins	810	30.08	30.74	28	29.55	23	1.19	68	18	...	26.9	49	17
			...	...	...	...	...	...	...	...	...	26.9	49	17
Mean			30 09	30.74	28	29.55	a	1.05	77	20	...	24.6	56	21

*Mean of the tri-daily observations. †Mean of the Max. and Min. by the Draper Thermogr observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4. ‡ Blank in (1) Voluntary Observer. (2) U. S. Weather Bureau. (1a) City Reservoir; (2a) Intake Conduit, (a) 6, 23; (b) 5, 14; (c) 14, 18; (d) 7, 17, 18; (e) 7, 2, 4; (f) 7, 21; (h) 6, 7, 20; (j) 26, 27, 28; (k) 11, 5, 14; (x) 2, 6; (y) 3, 6; (z) 8, 9; (aa) 7, 10; (ab) 8, 9, 22; (ac) 9, 23; (ad) 7, 8; (ae) 12, 13; (af) 7, 9; (ag)

FOR FEBRUARY, 1897—(Continued).

TEMPERATURE—(IN DEGREES FAHR.).							SKY				PRECIPITATION—(INCHES).							Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rain fall.	Duration.	Date.	Total snow fall.		
-13	5	55	18	49	14	4	ab	9.1	8.9	10.0	7.4	2.73	1.23	h. m. 16.00	22-23	.....	.....
-5	14	53	16	31	14	4	8	6	12	10	10	2.05	0.80	.....	12	11.4	N.
-6	27	55	19	43	14	5	8	7	12	9	3	2.50	1.23	16.00	22-23	11.0	W.	
-4	14	51	17	36	14	4	9	8	9	11	9	2.61	0.90	.....	12	13.3	N.
-11	14	60	21	49	14	7	22	12	6	10	7	2.66	1.03	.....	12	12.5	N.
-13	5	67	20	48	14	8	12	10	10	8	10	2.66	1.10	16.00	12	13.5	N.	
-4	14	53	16	37	14	5	7	6	11	11	4	3.28	1.20	.....	12	12.0	N. W.
-1	14	52	16	32	15	6	ac	.....	.....	.....	7	3.35	0.90	12.30	13	16.0	N. W.
-2	1	52	18	34	1	4	22	15	2	11	9	2.76	1.01	16.00	12	10.8	N. W.	
-4	p	46	16	33	25	5	ad	12.0	5.7	10.3	9.5	1.48	0.60	16.00	12	.....	.....
-4	28	43	15	30	25	7	15	10	8	10	10	1.73	0.60	16.00	12	12.8	E.	
-3	r	47	15	29	26	5	ad	15	6	13	6	1.44	0.60	.....	12	13.0	E.
-4	14	46	15	32	5	5	8	11	9	8	10	1.04	0.25	.....	7	2.7	W.
-3	28	49	17	33	25	7	6	.....	.....	.....	12	1.69	0.48	.....	12	.....	.....
-12	1	57	20	39	1	2	22	8.5	7.0	12.5	6.0	1.92	1.03	15.00	7	.....	.....
-9	27	53	18	38	15	8	ae	.....	.....	.....	5	1.43	0.55	.....	23	11.3	W.
-8	1	54	19	32	2	2	22	5	7	16	6	1.86	0.51	15.00	6-7	12.0	S. W.	
-12	1	63	22	39	1	4	7	12	7	9	7	2.48	1.03	15.00	7	15.2	N. W.	
-16	5	53	18	44	14	4	8	8.3	12.2	7.5	7.6	1.88	1.00	.....	8	.....	.....
-7	s	52	18	34	20	9	16	.....	.....	.....	10	1.79	0.48	.....	27	21.8	S. W.
-16	5	58	21	43	b	6	ad	9	6	13	8	1.65	0.50	13.00	25	14.0	N. E.	
-4	b	48	17	44	14	4	8	2	23	3	8	1.35	0.35	.....	6	11.6	W.
-8	26	52	19	36	10	8	8	11	11	6	7	1.79	0.59	6.00	6	10.0	S. W.	
-7	t	49	16	30	14	7	8	11	9	8	5	2.80	1.00	.....	8	28.0	S. W.
-2	11	41	12	36	14	2	af	5.4	8.0	14.6	10.8	1.74	1.58	.....	6	.....	.....
3	28	41	13	30	5	5	ag	3	9	16	2	1.59	1.18	.....	6	4.5	S. W.
6	28	39	11	22	5	3	9	2	8	18	14	3.13	1.58	.....	6	.....	W.
5	12	41	14	31	14	6	15	5	8	15	10	2.45	1.45	.....	6	.....	W.
5	28	41	14	25	14	5	15	2	9	17	19	2.31	0.87	.....	6	13.7	S. W.
0	1	43	12	29	1	3	y	3	8	17	11	1.93	1.42	.....	6	4.5	E.
6	27	38	12	23	26	4	ah	.....	.....	.....	7	1.70	.....	.....	.....	3.5	W.
2	1	44	14	36	14	4	bb	15	4	9	9	0.99	0.31	.....	20	5.5	.....
6	u	37	12	24	r	3	7	7	12	9	11	1.66	1.27	.....	6	8.6	E.
4	28	41	12	32	14	4	7	3	9	16	16	1.26	0.28	.....	6	8.5	S. E.
-2	11	47	14	31	14	3	12	15	2	11	13	1.14	0.25	.....	13	6.8	S. W.
8	28	49	11	27	14	4	bc	4	12	12	6	0.95	0.26	.....	6	6.5	W.
7	28	40	10	19	20	2	af	0	7	21	12	1.74	0.72	.....	6	.....	W.
6	27	42	14	37	14	4	bd	6	7	12.3	9.0	5.3	1.08	0.60	12
6	27	41	14	33	14	4	12	6	18	4	5	1.40	0.60	.....	12	10.0	N. W.
7	v	43	14	29	14	5	12	11	8	9	5	0.93	0.50	.....	12	6.5	N. W.
7	27	42	13	37	14	4	8	3	11	14	6	0.91	0.50	.....	12	7.1	W.
-28	28	50	17	60	0	1	22	8.0	8.6	11.4	8.2	1.90	1.50	.....	5	11.2	N. W.

aph. † Report received too late to be used in computing means. The means from the tri-daily indicates that the duration is not shown in the original records, but is within twenty-four hours. nine miles north of city.

12, 13, 27, 28; (m) 1, 4; (n) 1, 4, 5, 14; (p) 14, 28; (r) 1, 14; (s) 1, 3; (t) 5, 11; (u) 1, 28; (v) 27, 28; (w) 1, 7, 8, 9; (ah) 3, 7, 9, 12; (bb) 7, 12; (bc) 15, 16; (bd) 8, 19; (be) 8, 13.

TEMPERATURE—FEBRUARY, 1897, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	20	28	25	26	25	35	36	33	28	25	20	23	23	30
Alfred	38	34	24	37	36	42	42	33	28	26	26	28	29	43
.....	16	19	19	13	14	26	30	26	23	16	2	18	9	16
Angelica	37	34	27	33	39	44	40	35	29	28	27	28	28	41
.....	-8	18	18	13	5	30	31	28	24	18	5	18	12	14
Bolivar	37	36	27	35	38	44	35	36	30	30	29	32	36	44
.....	-5	18	20	15	11	27	31	26	24	21	16	22	24	11
Friendship	41	38	29	35	42	44	44	39	30	33	28	33	32	43
.....	-6	17	21	13	5	30	31	28	14	20	13	21	10	32
Franklinville	37	33	27	34	38	39	37	33	29	26	25	30	30	40
.....	-7	11	14	9	12	29	31	26	23	21	10	21	13	14
Humphrey	38	40	27	41	37	40	40	34	28	30	30	30	40	44
.....	15	23	22	17	22	26	29	26	22	21	15	18	13	22
Arkwright .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jamestown	39	41	32	31	40	44	38	33	30	34	37	34	31	44
.....	10	27	25	16	19	31	30	29	24	24	24	20	16	21
Elmira	34	35	28	34	39	43	41	43	35	32	31	29	28	49
.....	-1	25	20	19	10	28	31	31	30	20	15	19	15	8
Avon	33	32	30	29	43	38	40	.....	37	30	22	25	27	43
.....	2	13	24	13	5	32	33	.....	28	18	10	17	13	7
Mount Morris .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lockport	38	36	35	34	44	40	38	38	37	33	26	25	30	40
.....	17	24	25	21	18	34	34	32	28	18	14	18	16	15
Victor .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wedgewood	32	36	27	44	34	40	39	36	34	27	34	24	35	48
.....	11	20	17	14	15	25	32	28	24	12	8	16	9	10
Addison	37	35	29	35	37	43	44	37	34	34	29	30	28	48
.....	-7	21	23	18	7	29	36	33	29	20	15	20	10	4
South Canisteo	36	40	29	34	36	40	43	39	34	36	25	27	35	49
.....	7	16	21	14	7	24	32	30	26	18	5	10	18	34
Arcade	36	34	25	31	40	37	37	36	28	25	22	30	28	40
.....	12	18	19	11	15	30	29	26	23	17	8	12	12	19
<i>Eastern Plateau...</i>	13	27	24	22	20	33	38	34	30	24	19	18	15	20
Binghamton (1)	33	40	33	36	37	41	43	36	32	30	32	26	25	46
.....	-10	24	19	12	3	26	35	31	27	18	12	17	-2	-5
Binghamton (2)	35	38	31	32	38	43	43	34	32	29	30	24	22	46
.....	-6	26	20	14	4	30	36	30	27	17	13	17	12	-3
Oxford	37	40	30	33	34	45	46	41	40	39	30	27	25	42
.....	-8	14	19	23	25	28	36	32	31	30	23	0	5	-7
Cortland	30	35	34	34	35	36	42	35	35	29	27	26	23	42
.....	0	22	12	12	5	26	29	31	28	12	10	12	13	5
South Kortright	27	30	31	32	37	44	43	36	34	28	24	22	21	32
.....	-13	9	18	6	-6	25	31	27	21	15	9	8	4	-10
Port Jervis	32	35	40	35	36	42	42	40	38	34	30	24	28	38
.....	-3	16	27	18	3	28	38	33	29	29	16	13	16	0
Cooperstown	29	33	26	25	25	39	39	35	31	27	15	15	18	37
.....	-8	7	12	8	-5	22	34	31	25	12	10	10	1	-10
Garrattsville	32	39	37	33	38	40	47	35	34	30	24	19	26	41
.....	2	19	18	14	8	20	32	29	23	11	7	10	4	1
New Lisbon	30	37	30	30	39	41	40	34	30	27	24	18	20	39
.....	-13	13	12	8	-4	27	32	28	23	12	4	13	0	-11
Oneonta	34	41	35	36	40	44	45	38	35	32	32	23	27	44
.....	-4	13	19	13	2	30	35	30	26	20	11	12	9	-3
Perry City	33	36	26	30	35	40	41	38	34	24	25	25	25	43
.....	0	15	15	5	2	25	32	30	23	12	17	16	0	0
Strait's Corners	30	35	27	32	34	42	41	35	35	27	28	24	26	44
.....	-3	22	17	10	3	22	33	30	25	15	10	17	-1	-2
Waverly	40	42	33	41	42	43	43	37	34	33	34	28	37	52
.....	-9	25	18	17	5	29	34	32	27	23	13	18	7	.....
Dryden	30	38	26	29	35	42	42	35	32	28	27	24	20	43
.....	2	21	9	9	7	25	33	30	25	11	10	16	5	5
Mobouk Lake	38	30	32	26	39	35	41	34	39	30	21	14	29	34
.....	11	20	23	14	14	24	35	29	28	22	10	10	10	14

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	Monthly mean.
31	30	35	33	26	24	36	33	31	23	26	14	12	15	26.6
32	32	45	40	32	30	37	38	37	23	32	19	16	21	24.7
26	23	20	26	19	10	28	22	25	13	19	1	1	2	
35	37	46	37	30	32	35	40	31	29	30	24	16	20	24.7
22	17	30	26	16	8	29	31	24	14	20	4	0	2	
35	34	46	34	32	32	40	38	32	30	33	22	24	27	25.7
22	22	14	27	17	9	30	28	21	14	19	2	1	4	
38	36	48	41	33	35	42	41	40	34	36	22	20	26	26.8
25	21	17	16	17	12	33	28	25	16	19	6	5	6	
40	33	44	41	29	30	42	37	38	28	28	20	19	22	24.3
21	26	12	27	17	8	29	25	24	14	19	4	3	5	
33	31	48	40	33	33	40	38	38	28	29	25	16	22	26.8
26	25	24	25	20	15	30	26	23	13	16	3	4	7	26.4
36	33	45	41	32	36	42	41	39	29	30	22	16	24	28.2
29	27	25	27	23	23	32	31	25	14	18	7	4	7	
39	39	51	42	33	36	45	40	37	33	40	22	19	29	28.8
30	30	30	32	28	17	30	34	30	19	24	11	9	14	
35	36	42	34	33	37	42	40	40	30	34	24	20	20	26.0
28	26	31	24	24	16	32	16	29	18	20	8	7	10	
44	44	46	41	35	42	44	35	37	31	34	28	23	23	28.8
26	30	29	29	26	20	31	26	22	16	15	8	6	8	
35	37	51	43	33	29	42	35	35	37	40	20	28	29	26.4
26	25	20	27	19	14	28	25	25	14	18	4	4	4	
36	37	50	40	36	33	43	39	39	34	36	23	23	28	27.9
28	25	28	31	25	14	30	29	30	17	23	12	6	8	
37	39	50	36	36	32	44	38	39	40	38	20	22	32	26.8
23	18	26	29	15	8	29	25	24	13	17	4	0	2	
33	34	44	38	29	33	40	38	35	24	29	19	15	21	24.4
25	24	22	26	17	12	29	24	23	13	14	5	5	2	
28	30	31	35	24	22	35	32	31	24	27	17	12	15	25.0
38	37	50	41	32	33	41	37	37	36	39	26	23	26	
20	22	13	31	18	9	28	30	29	19	21	12	4	9	25.9
35	36	50	36	30	32	42	38	36	31	37	18	24	25	
25	22	16	31	16	9	32	30	30	19	22	12	5	9	26.0
35	40	47	40	23	35	44	37	38	33	40	30	25	30	
12	25	11	27	13	3	25	25	24	11	12	5	0	0	26.2
41	35	45	46	32	32	42	39	23	34	38	19	16	20	
7	27	32	23	23	22	28	27	17	16	8	5	5	4	25.0
39	38	46	43	30	26	45	38	38	29	39	30	21	24	23.2
20	25	12	27	8	7	25	22	23	14	17	10	—2	—4	
33	40	43	42	36	36	48	40	39	35	40	32	28	31	28.1
19	28	13	32	25	15	28	30	31	21	14	18	8	9	
32	34	44	42	30	31	40	32	34	28	37	22	19	22	21.3
20	25	20	30	15	11	22	24	22	20	15	6	—2	4	
34	30	44	40	31	34	43	35	36	31	34	21	22	21	24.3
20	22	20	28	12	9	26	23	25	18	15	3	2	4	
34	34	44	41	29	32	42	34	37	27	35	20	19	20	21.8
13	20	11	28	15	1	25	25	26	17	6	3	—5	1	
38	37	49	44	35	39	45	40	42	34	41	29	27	28	27.3
22	28	20	32	18	12	30	27	30	20	20	14	3	10	
36	36	49	40	31	34	42	37	36	28	36	18	19	18	23.6
24	16	14	28	17	9	27	26	26	15	18	2	—1	—2	
40	37	.....	.....	36	30	41	35	40	32	38	25	28	30	23.3
25	14	.....	.....	3	27	27	28	29	15	13	10	0	5	
38	41	54	38	36	33	47	38	37	34	37	26	28	31	27.7
23	24	13	30	25	10	31	31	30	18	21	12	2	8	
34	34	42	43	29	33	41	37	.....	29	37	22	19	24	24.6
22	25	16	28	19	11	30	28	.....	18	21	9	4	5	
30	36	36	44	34	29	46	34	35	29	32	25	23	27	26.2
24	26	25	28	19	20	30	28	26	18	22	12	10	10	

TEMPERATURE—FEBRUARY, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau</i>	15	21	19	17	17	30	36	30	23	15	9	10	8	15
Saranac Lake.....	45	35	30	40	50	43	42	30	29	23	25	7	27	41
Gloversville.....	-10	5	-10	-14	-10	32	29	17	5	-14	-13	-7	-7	-3
Little Falls (2a).....	29	35	35	28	30	35	41	34	32	29	22	14	22	34
North Lake.....	-7	12	17	7	-1	23	34	31	27	14	7	8	6	-4
Lowville.....	29	33	27	28	29	40	42	42	32	33	21	35	19	33
Number Four.....	12	7	2	10	1	26	30	23	11	-3	-1	-1	-11	-1
Atlantic Coast.....	34	35	38	34	35	41	39	38	29	28	24	25	17	21
Brooklyn.....	-16	-16	13	-1	-8	-6	27	27	19	5	-7	-6	-4	-8
Manhattan Beach.....	33	34	22	33	37	36	41	34	30	29	17	22	22	37
New York City.....	-5	10	10	-1	-3	27	33	29	21	4	-3	3	-4	-7
Willet's Point.....	32	39	30	32	37	37	40	32	27	26	20	17	16	34
	0	13	16	5	5	28	30	26	18	2	-3	6	-2	2
<i>Atlantic Coast</i>	22	28	30	25	23	34	41	36	34	33	29	23	22	25
Brooklyn.....	34	32	34	32	35	43	46	40	41	37	34	25	32	42
Manhattan Beach.....	17	26	29	23	17	31	39	34	33	30	25	23	20	18
New York City.....	30	36	34	33	28	36	41	45	35	40	36	31	24	31
Willet's Point.....	16	16	28	22	16	16	34	32	32	28	24	20	20	12
	35	35	34	36	36	45	45	43	39	37	36	27	31	38
	21	27	25	23	20	31	38	32	32	30	21	20	20	19
	40	35	34	32	34	46	47	38	35	41	35	25	30	42
	10	28	24	11	9	31	32	32	22	23	20	17	13	15
<i>Brentwood</i>	34	37	33	35	41	45	50	44	41	40	36	27	32	42
Setauket.....	0	23	28	0	0	28	28	26	29	20	21	20	15	0
Bedford.....	33	34	34	31	33	44	46	38	38	39	32	28	26	40
Primrose.....	9	24	27	17	13	26	27	32	30	27	23	21	20	12
	42	35	34	37	46	40	45	40	41	40	36	24	30	41
	-4	14	26	15	1	25	37	28	29	26	17	15	10	-1
	35	35	33	29	35	40	46	38	41	40	41	23	29	41
	-6	13	27	19	0	24	35	28	30	25	20	17	7	0
<i>Hudson Valley</i>	13	22	26	20	15	29	40	34	34	29	19	16	12	14
Albany.....	26	33	32	27	31	46	46	39	37	34	23	15	21	26
Lebanon Springs.....	-3	11	18	11	2	26	39	35	31	14	11	9	5	-5
Honeymead Brook.....	28	41	34	25	32	36	44	36	35	30	22	17	18	38
Poughkeepsie.....	-5	7	20	5	-2	21	33	31	28	22	5	8	-3	-5
	30	33	29	29	28	40	42	39	35	34	23	24	21	32
	3	13	20	8	-3	22	36	31	31	25	10	13	5	-4
	33	32	31	30	32	39	45	38	40	38	27	22	25	38
	-10	9	21	4	-6	20	32	26	30	24	14	12	-3	-11
<i>Wappinger's Falls</i>	30	34	32	35	29	38	45	41	40	38	28	24	18	38
Catskill.....	-12	7	22	10	-13	18	35	29	30	26	14	16	0	-10
West Point.....	29	34	32	27	30	41	43	39	37	34	24	16	24	33
Carmel.....	-1	10	22	15	2	24	38	33	31	22	11	9	7	-4
	27	35	33	32	31	33	41	40	38	39	36	28	20	23
	2	6	20	18	6	8	31	31	32	30	16	15	10	-1
	32	39	31	32	35	38	47	39	38	37	34	22	22	34
	-2	13	14	10	5	20	35	30	24	21	13	13	7	1
<i>Mohawk Valley</i>	13	23	20	18	18	31	35	32	27	18	15	11	11	15
Little Falls (1a).....	26	30	27	27	28	37	39	32	31	19	24	14	16	31
Canajoharie.....	7	13	11	8	10	29	30	24	14	4	7	1	1	6
St. Johnsville.....	26	35	30	32	31	36	40	38	35	36	24	16	19	26
Rome.....	-3	12	14	11	2	25	35	33	28	14	11	9	7	-3
	24	31	29	27	31	35	40	36	33	31	23	17	18	23
	-3	13	11	6	-1	25	33	31	26	18	6	9	4	-4
	20	35	30	28	30	35	38	35	37	20	18	16	19	28
	6	13	6	4	12	28	29	25	14	5	8	4	0	10
<i>Champlain Valley</i>	7	16	21	13	8	22	37	38	33	19	9	6	8	6
Plattsburgh Bar'ks.....	20	24	25	21	11	27	40	44	37	30	12	5	10	16
Glens Falls.....	-4	1	8	0	-5	-5	25	35	24	8	-2	-3	2	-8
Lake George.....	21	34	31	22	24	39	45	43	39	31	16	12	18	22
	-8	2	15	4	-5	15	36	33	30	15	6	7	0	-6
	27	34	29	25	30	40	41	39	39	25	20	11	23	24
	-12	0	15	3	-7	15	37	32	31	7	3	6	-4	-9

REGIONS AND DAILY MAXIMA AND MINIMA FOR THE STATIONS—(Con.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	Monthly mean.
28	28	30	31	21	20	27	25	28	21	19	6	7	5	20.1
34	37	37	34	24	36	38	32	33	27	35	22	17	19	17.5
25	18	24	16	4	8	6	11	17	15	-4	-18	-8	-28	
33	37	38	38	30	30	40	34	35	26	35	24	20	22	23.0
28	26	24	30	20	15	25	23	25	16	4	8	0	6	
34	36	42	36	37	31	41	33	37	35	47	21	26	24	20.6
25	13	24	18	4	7	25	24	17	5	-3	-12	-1	-19	
35	29	32				33	35	32	31					
12	22	17				-3	16	24	15	-4	-19	-20	9	18.6
35	35	41	41	29	31	37	33	35	26	32	25	13	13	
22	26	19	29	17	8	24	18	25	19	0	-9	-7	7	20.8
31	32	38	38	30	30	35	28	32	23	31	11	14	11	
21	24	23	25	14	3	27	16	22	12	11	-9	10	-3	20.0
33	36	35	40	34	30	39	37	38	33	32	30	24	26	31.1
43	43	48	48	40	35	52	40	46	37	39	39	32	36	33.2
30	32	29	38	30	26	32	37	33	27	28	25	19	19	
39	38	41	45	42	38	36	48	37	46	38	38	33	29	30.6
22	32	30	32	30	24	26	34	32	28	28	26	18	18	
41	40	46	47	36	37	53	40	45	36	42	34	29	31	33.0
32	31	30	36	29	26	32	32	32	26	30	22	17	18	
40	41	41	45	45	38	38	39	40	47	37	39	34	37	30.6
20	21	28	29	29	23	26	32	32	27	27	26	18	17	
44	45	44	47	38	39	54	38	46	37	40	39	33	35	30.6
27	31	19	33	28	15	33	34	33	26	15	23	15	16	
41	39	42	42	37	34	47	41	44	37	40	34	30	34	21.2
30	30	28	34	29	25	32	33	32	28	26	26	18	19	
37	43	49	46	39	44	51	39	45	36	38	36	30	34	29.7
21	30	18	33	25	15	29	33	31	24	21	22	11	15	
38	41	45	47	38	38	56	36	49	39	49	34	32	35	29.6
18	31	18	30	26	18	31	36	32	26	20	24	13	18	
25	33	30	36	30	26	38	34	37	29	29	24	17	21	26.2
35	40	42	42	35	35	48	36	44	33	38	27	27	29	26.0
8	29	22	35	23	15	30	26	31	23	25	14	8	13	
40	36	39	34	32	36	49	38	41	34	38	32	22	25	23.6
14	29	17	18	22	9	25	27	27	14	18	10	-6	4	
37	39	43	42	32	36	47	37	46	32	40	25	26	28	25.2
15	22	11	29	21	10	28	29	29	20	18	17	5	8	
32	44	44	46	36	34	49	37	46	34	41	32	29	34	25.6
12	27	9	31	19	11	29	30	27	21	17	18	7	15	
36	45	47	49	38	48	54	40	46	35	41	33	28	33	27.2
18	29	16	29	26	18	30	30	31	25	19	18	10	14	
32	40	41	42	36	32	49	37	42	39	37	31	30	31	26.9
13	28	16	34	24	20	27	29	32	24	22	18	8	11	
38	35	42	47	44	36	37	51	38	46	35	38	32	30	27.6
6	24	24	30	30	21	28	32	32	24	21	23	11	14	
37	42	46	43	35	37	50	38	44	34	39	31	25	31	27.1
20	26	20	24	22	15	29	34	33	22	21	22	8	8	
28	31	32	32	24	27	33	30	29	24	23	15	14	13	22.9
32	34	34	34	26	37	39	34	34	26	34	15	19	19	21.0
25	21	20	20	15	20	24	24	18	17	4	1	6	-4	
35	37	41	30	35	34	43	44	39	32	39	35	24	24	25.3
24	29	22	33	22	18	27	25	29	23	16	12	6	11	
32	36	42	40	32	31	41	33	35	28	36	27	22	22	23.0
17	27	20	30	20	14	26	25	25	21	14	6	2	10	
34	40	46	38	30	40	41	34	35	30	33	20	20	24	22.2
23	25	27	20	13	20	24	25	18	15	5	3	10	-3	
21	31	26	34	27	19	34	31	28	28	24	16	6	14	30.5
35	33	34	43	39	26	34	43	28	37	30	26	6	22	17.8
-3	27	18	22	20	15	19	14	13	23	10	-3	-9	-5	
40	40	40	40	32	35	46	36	40	31	40	27	23	23	22.6
10	21	12	29	18	6	27	34	26	20	13	10	-2	10	
36	40	38	41	37	31	51	37	42	36	39	28	25	29	21.1
8	20	12	27	17	3	25	20	20	19	10	8	-5	2	

TEMPERATURE — FEBRUARY, 1897, SHOWING DAILY MEAN
STATIONS—

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Valley</i>	11	15	19	13	8	22	30	33	26	11	7	7	7	16
Madison Barracks	18	24	26	22	16	45	45	41	34	27	22	16	14	17
	-7	6	11	3	-5	27	34	31	20	3	0	6	-7	4
Canton	29	25	24	21	27	42	41	35	32	23	11	9	18	37
	-12	-4	9	-7	-16	15	35	29	18	0	-4	2	-10	-6
North Hammond	28	22	28	28	20	36	32	36	34	20	20	10	22	40
	-4	10	14	8	-4	18	44	32	20	-2	-2	4	4	-4
Ogdensburg	30	26	30	27	27	43	44	35	34	30	18	20	20	35
	2	8	15	8	6	18	33	27	20	-6	-1	3	0	6
Potsdam	25	23	21	16	21	39	42	34	31	21	11	5	15	53
	-1	7	9	2	-7	13	33	27	21	-2	-7	-3	-3	3
<i>Great Lakes</i>	21	24	26	22	26	35	36	33	30	24	18	19	20	28
Westfield	36	31	30	27	46	42	37	35	32	30	28	34	29	42
	12	21	22	15	15	28	32	30	26	21	17	20	15	26
Buffalo	37	31	32	28	43	41	38	36	32	30	22	25	30	41
	22	24	24	20	21	34	32	29	29	17	14	17	12	21
Pittsford	35	32	29	30	40	40	41	42	35	33	20	22	26	43
	6	15	22	15	11	30	34	30	26	15	11	5	15	12
Rochester	36	32	30	30	38	41	42	34	34	29	22	22	24	41
	13	20	25	22	18	32	34	27	26	17	16	15	15	16
Appleton	29	32	32	31	37	35	38	35	34	32	25	24	34	37
	0	13	29	18	16	32	34	31	29	18	18	18	18	14
Fort Niagara	33	33	33	31	37	38	37	37	33	33	25	24	30	38
	10	19	29	19	14	32	33	31	29	18	15	20	15	15
Baldwinsville	29	35	27	28	36	36	37	36	34	31	23	18	24	42
	2	14	14	12	6	28	33	31	26	12	7	14	10	6
Ridgeway	30	31	30	27	36	37	37	36	35	31	20	25	26	38
	6	14	27	17	14	32	34	25	23	16	14	17	11	14
Oswego	30	27	25	28	35	38	39	36	33	33	20	18	21	40
	7	18	16	11	9	29	35	30	27	11	9	13	10	8
Palermo	27	29	23	26	33	36	38	35	35	31	18	16	18	37
	1	9	15	6	0	29	34	31	26	9	-2	13	7	3
Lyons	33	32	28	30	37	38	42	36	35	32	20	20	23	42
	17	22	23	15	15	32	35	31	28	15	11	15	15	15
Erie, Pennsylvania	34	29	29	28	38	42	34	32	30	30	29	34	29	43
	20	22	26	26	19	33	32	29	28	21	20	18	18	29
<i>Central Lakes</i>	23	29	22	22	24	36	38	34	30	22	18	22	18	26
Fleming	35	35	34	29	38	43	42	36	34	30	19	25	24	43
	15	21	11	11	13	29	32	30	26	12	9	17	13	10
Romulus	34	36	27	32	37	43	44	38	34	32	26	24	25	40
	12	23	16	16	14	29	34	31	27	13	11	19	11	11
Ithaca	32	34	26	31	36	42	42	35	33	30	29	26	25	45
	10	24	16	15	8	29	35	31	27	15	12	19	9	8
Mean	16	23	23	20	18	31	37	34	30	22	16	16	14	20

† Max and Min. by the Draper Thermograph.
Conduff, nine miles north of city.

|| Received too late to be used in computing

FOR THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	Monthly mean.
27	30	32	34	23	24	32	21	24	23	25	7	9	7	20.0
28	34	41	42	34	45	37	39	33	31	34	20	16	17	20.2
11	25	23	31	18	11	15	14	12	15	18	-5	8	-3	
39	41	41	39	29	33	41	28	35	30	35	16	26	15	18.8
14	20	26	28	14	6	27	12	15	18	15	-4	-4	-5	18.8
36	34	44	38	34	36	42	30	34	24	34	24	14	18	21.3
28	26	26	32	16	12	28	12	20	18	20	-2	0	0	21.0
34	36	40	40	29	34	40	32	29	34	32	18	18	19	21.0
23	20	20	22	10	13	25	10	14	17	12	-8	0	1	18.8
34	36	39	38	37	30	39	25	30	28	32	18	18	16	
23	23	24	26	13	14	24	11	17	18	18	-4	0	-5	
31	32	37	35	29	29	36	33	31	24	26	15	13	13	26.6
39	35	46	40	32	44	37	45	35	33	33	29	18	26	28.1
29	28	30	28	25	15	32	30	25	24	17	9	6	5	
34	35	44	36	34	40	40	45	35	29	31	21	15	20	28.0
29	29	31	28	26	23	33	26	21	19	13	10	8	6	
35	37	46	42	31	37	43	39	39	27	35	20	19	23	26.6
29	29	26	28	14	19	32	28	28	19	21	8	9	6	
34	35	46	39	32	39	43	41	36	28	32	16	17	19	27.0
29	30	29	28	26	21	33	25	23	19	14	9	8	5	
27	38	43	40	32	36	40	33	34	28	32	19	19	21	26.6
24	26	26	30	27	19	32	25	28	18	18	10	8	2	
34	37	43	42	35	34	42	44	35	31	33	23	21	20	27.6
24	27	30	30	27	22	33	25	28	17	20	10	6	13	
37	39	46	43	31	38	43	36	35	31	37	22	22	22	25.7
25	26	24	31	23	21	32	28	29	21	21	10	9	7	
37	37	43	41	32	35	40	33	34	29	33	20	19	19	26.1
26	29	29	29	26	21	33	24	23	17	20	10	7	6	
34	35	45	43	32	36	40	32	36	28	36	20	19	16	25.0
29	29	27	31	23	22	29	24	28	22	20	7	7	4	
36	32	45	37	34	31	39	34	34	30	36	23	15	16	23.1
25	28	24	32	23	12	28	24	28	18	16	5	1	5	
34	33	48	43	38	35	43	38	39	30	36	21	20	23	27.6
30	29	28	30	27	24	33	27	27	21	20	11	12	8	
33	37	47	34	32	43	40	46	37	30	33	20	16	24	28.0
30	28	33	28	26	24	31	31	21	18	15	12	8	7	
32	32	37	37	29	26	36	33	34	26	29	16	14	17	27.2
34	37	47	43	33	34	42	37	39	34	37	22	22	22	26.8
27	28	26	30	29	20	29	26	29	19	21	9	6	10	
37	38	50	42	34	34	44	39	37	34	38	22	20	26	27.8
29	27	24	31	25	20	31	28	31	20	20	10	7	7	
37	36	49	42	32	32	41	36	36	30	36	24	21	24	26.9
28	28	23	32	24	14	31	30	29	20	24	10	7	12	
28	31	32	35	27	25	35	31	31	36	26	16	13	15	24.6

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City Reservoir. (2a) Intake

DAILY AND MONTHLY PRECIPITA

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau.</i>	0.00	0.00	T.	0.00	T.	0.60	0.11	0.05	T.	0.01	0.01	0.36	0.02	T.
Alfred			T.		T.	.52	.07	.02	.05	.02	.02	.44		
Angelica .....						.30	.25	.05	T.			.30	.10	
Bolivar .....						.50	.08					.35		
Friendship					T.	.86	T.	T.	T.	T.	T.	.25	T.	
Franklinville .....						.98	.08	.06	T.	.01	.03	.30	.30	
Humphrey .....						.98	.08	.08		.10		.35		
Little Valley														
Cherry Creek						1.29	.40	.10	T.	.09	.05	.09	.10	
Jamestown					T.	.96	.14	.20	T.			.40	T.	
Elmira .....						.28						.65		
Pine City					T.	T.		.11	T.	T.		.56		
Akron						1.37	.07	.09	T.	T.	T.	.53	T.	T.
Avon .....						.44	T.	.05	T.	T.		.05	T.	
Mt. Morris					T.	.30			T.	T.		.50		
Lockport .....						.90	1.00	T.		T.		.40	.20	
Victor														
<i>Tyrone.</i>														
Wedgewood .....						.15		T.		T.		.50		
Addison .....						.18	.02	T.				.42	.02	
Atlanta .....						.43						.24		
Haskinville ....						.20	.06					.20	T.	
South Canisteo....					T.	.60	T.	.07				.40		
Arcade .....						.80	.04	.11	.03	.02	.01	.25	.01	
Attica														
<i>Eastern Plateau.</i>	0.00	0.00	T.	0.00	0.00	0.13	0.13	0.04	0.01	T.	0.05	0.75	0.06	0.00
Binghamton (1) ..						.08	.11	.10	.02	T.		1.00	.30	
Binghamton (2) ..						.06	.07	.08	T.	T.		.60	.05	
Oxford .....							.34	.08				1.00	.05	
Cortland .....			.05			.13	.04		.07				.60	
South Kortright....							.30					.53		
Brookfield														
Middletown														
Port Jervis						*	+1.07				*	+1.00		
Warwick .....						.40	.35	.05				.78		
Cooperstown .....							.15	.05				1.10		
Garrattsville						T.	.18	.05	T.			1.20		
New Lisbon .....						.07	.16	.05				.67		
Oneonta .....											.81	.93		
Perry City .....						.22	.06	.06	T.			.55	.12	
Newark Valley .....						.12	.08	.09				.70	.05	
Straits Corners .....						.05	.07	.08	T.	T.		1.00		
Waverly .....						.61	.04	T.	T.	T.		.65		
Dryden .....						.18	.06					.25		
Mohouk Lake						*	+1.22					1.00		
<i>Northern Plateau.</i>	0.00	0.00	0.00	0.00	0.00	0.18	0.17	0.08	0.06	0.00	0.00	0.41	0.02	T.
Saranac Lake						T.	.30	T.	.07			.15		T.
Gloversville						*	+ .38	*	+ .03			.37	.07	*
Little Falls (2a) ..						.28		.02	.02			.45		
North Lake .....						.10	.10	.20	.30			.40		
Lowville .....						.29	.02	.05				.30	.10	
Number Four .....						.28	.21	.18				.47		
Kings Station .....						.10	.40					.70		
<i>Atlantic Coast</i>	0.00	0.10	0.03	0.12	0.19	0.53	0.15	0.05	0.00	0.00	0.04	0.75	0.02	0.00
Brooklyn .....		.32				.50	.28	.04				1.07		
Manhattan Beach ..			.20			*	+ .60	*	+ .02			.10	.20	
New York City .....		.30	.02			.58	.16	.02				1.00	T.	
Willet's Point .....			.20	1.00	1.50			T.			.28	.45		

TION FOR FEBRUARY, 1897—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total.
0.06	0.03	0.01	0.02	0.01	0.04	T.	0.06	0.04	0.03	0.02	0.01	0.01	0.02	1.55
.10	.05	.03	.....	.05	.05	.....	.04	T.	.15	.02	.03	.....	.01	1.67
.05	.....	T.	.....	T.	.10	T.	.24	T.	.10	.08	T.	.....	.....	1.57
.11	.....	.....	.06	.....	.06	.....	.10	.10	.08	.....	.....	.....	.....	1.44
.10	T.	T.	.08	.....	T.	.....	.22	T.	T.	.05	T.	.....	T.	1.56
.....
.06	.07	.....	.08	T.	.04	.01	.12	.08	.03	.01	.01	.....	.01	2.01
.10	.08	.15	.....	.04	.25	.....	.17	.03	.....	.05	.....	.....	.10	2.56
.....
.06	.06	.....	.05	.05	.....	.05	.13	.04	.07	.07	T.	.09	.10	2.39
T.	T.	T.	.13	T.	T.	.....	T.	.20	.10	T.	.10	T.	T.	2.23
T.	T.	T.	.....	T.	.06	.....	.03	.....	.....	T.	T.	.02	.....	0.93
.....	T.	T.	T.	.....	.21	.03	T.	T.	T.	.15	T.	T.	.05	0.78
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.50
.....
.10	T.	.....	.....	T.	.....	T.	T.	T.	T.	T.	T.	.....	T.	0.64
T.	T.	.....	.....	T.	.....	.....	T.	T.	T.	.....	T.	.....	T.	1.00
T.	T.	.....	.....	T.	.....	.....	T.	T.	T.	.....	T.	.....	.20	2.70
.....
.....
T.	.....	T.	.....	.10	T.	.....	.10	T.	.....	T.	T.	.....	.02	0.87
.01	.....	.....	.02	T.	.02	.....	.03	.....	.02	.....	.10	.....	.01	0.76
.04	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.04	.....	.03	0.83
.....
.17	T.	T.	.....	T.	T.	.....	T.	T.	.....	.....	T.	T.	T.	0.63
.20	T.	T.	.....	T.	.03	.....	.10	.20	.....	.....	T.	.....	T.	1.60
.08	.03	.01	T.	T.	.01	T.	.02	.08	.13	.02	.01	T.	T.	1.76
.....
.....
0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.18	0.13	T.	T.	T.	T.	0.01	1.76
T.	T.	.05	T.	T.	.....	T.	.....	.53	T.	T.	.....	.....	T.	2.09
T.	T.	.02	.01	.01	T.	.....	.22	.25	T.	T.	.....	.....	T.	1.37
.05	T.	.10	.11	.....	T.	.....	.10	.29	.05	.....	.....	.....	.....	2.09
.....	.....	.08	.04	.06	.....	.....	.....	.04	.....	.....	.....	.....	.....	1.11
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.53
.....
.....	.22	.....	.....	.....	.....	.11	.60	.....	.....	.....	.....	.....	.....	3.00
.....	.....	.....	.....	.....	.09	.....	.54	.....	.....	.....	.....	.....	.....	2.21
.14	.....	.....	.05	.....	.12	.....	.35	.10	.....	.....	.....	.....	.....	2.06
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.43
.....	.....	.....	.....	.07	.....	.....	.26	.25	.....	.....	.....	.....	.....	1.53
.....	.....	.....	.....	.....	.....	.....	.31	.04	.....	.....	.....	.....	.....	2.09
.10	0.3	.....	.....	.....	.....	.....	.05	.08	.....	.03	T.	.....	.03	1.33
T.	.....	.....	.....	.....	T.	.....	.05	.25	.....	T.	.....	.....	T.	1.34
.....
T.	.02	.....	.....	.....	.02	.....	.04	.....	.....	.01	.....	.....	.10	1.39
T.	T.	.....	.....	T.	T.	.....	.24	.12	.01	T.	T.	T.	T.	1.67
.05	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.59
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.02
.....
0.08	0.02	0.07	0.01	T.	0.11	0.06	0.15	0.31	0.11	0.02	0.06	0.01	0.06	1.99
*	+.13	.10	*	+.08	.09	T.	.31	*	+.20	T.	T.	.07	T.	1.50
+.12	.02	.02	.06	*	+.03	.28	.03	.53	.06	.01	.....	.....	.02	2.03
.11	.....	.15	T.	T.	.30	.....	.19	.05	.02	.01	.....	T.	.03	1.62
.....
.....	.09	.....	.....	.....	.....	.....	.10	.60	.30	.....	.....	.....	.....	2.10
.19	.....	.25	.....	.....	.....	.....	.14	.15	.15	.03	.....	.....	.29	1.75
.10	.....	.....	.....	.....	.....	.....	.30	*	+.44	.08	.39	*	+.42	3.21
.....	.....	.....	.....	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	1.75
.....
0.04	0.07	0.00	0.00	0.00	0.06	0.22	0.06	0.40	T.	0.00	T.	T.	0.00	2.87
.....	T.	.....	.....	.....	*	+.41	.02	.56	T.	.....	.....	.....	.....	3.20
.....	.30	.....	.....	.....	.....	.28	.02	.70	.....	.....	.....	.....	.....	2.42
.....	.03	.....	.....	.....	T.	.21	.....	.50	T.	.....	T.	T.	.....	2.72
.25	.....	.....	.....	.....	.....	.50	.....	.50	.....	.....	.....	T.	.....	4.68

DAILY AND MONTHLY PRECIPITA

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan. Coast (Con.)</i>														
Brentwood .....		.20	.20			.70	.....	.10				.60		
Setauket .....		.07	.05			.35	.10	.12				.90		
Bedford .....						.53	.48	.04				1.31		
Primrose		T.				1.05		T.				.56		
<i>Hudson Valley</i>	0.00	0.00	T.	0.00	0.00	0.06	0.47	0.04	T.	0.00	0.00	0.84	0.14	T.
Albany .....						.01	.35	.01	T.			.80	.12	
Lebanon Springs ..						*	+.65	T.				.62		
Honeymead Brook ..						.20	.20	.27	.03			.90		
Poughkeepsle .....						.24	.28	.03				1.03		
Wappinger's Falls ..			T.			.25	.42	.02				1.10		
Catskill						T.	.70	T.				1.20		
West Point .....								.05				.35	.90	.05
Boyd's Corners														
Carmel						*	+.82					1.01		
Southeast Reserv'r ..														
Eagle Mills .....							.85	.05				.50	.40	
Easton .....							.47					.87		
<i>Mohawk Valley</i>	0.00	0.00	0.00	0.00	0.00	0.03	0.15	0.12	0.01	0.00	0.04	0.48	0.01	0.00
Little Falls (1a) ..						.11	.09	.02			.05	.60		
Canajoharie						T.	.13					.60		
St. Johnsville .....							.25	.08				.23	.03	
Rome .....						.02	.18	.11	.05		.13	.48		
<i>Champlain Valley</i> ..	0.00	0.00	0.00	0.00	0.00	T.	0.61	0.15	T.	T.	0.00	0.30	0.02	0.00
Plattsburgh Barr'ks ..							.30	.45		T.				
Glen Falls .....							.51					.48		
Lake George						T.	1.03	T.	T.			.41	.05	
<i>St. Lawrence Valley</i> ..	0.00	0.00	0.00	0.00	0.00	0.19	0.17	0.18	T.	0.00	0.00	0.30	0.00	0.00
Madison Barracks ..						.16	.28	.06				.35		
Watertown														
Canton .....							.25		T.			.30		
DeKalb Junction ..						.03	.17	.01				.27		
North Hammond ..						.35	.18		.01			.20		
Ogdensburg .....						.59	.13					.40		
Potsdam								1.00				.30		
<i>Great Lakes</i>	0.00	0.00	T.	0.T.	0.01	0.66	0.09	0.05	0.01	0.01	0.02	0.24	0.06	T.
Westfield						1.18	T.	T.				.41		
Buffalo			T.		T.	1.58	.16	.06	T.	T.	T.	.51	T.	T.
Adams Centre .....						.06	.08	.16				.42	.12	
Pittsford						1.45	T.	.04		T.		.49		
Rochester			T.			.87	.02	.10	.02	.02	T.	.44	.14	T.
Scottsville														
Appleton						1.42	.10	.05	T.	T.	T.	.09	T.	.03
Fort Niagara						*	+.35	.04				.02		
Niagara Falls						1.35	.06					.37		
Baldwinsville					T.	.65	.03	.05			.10	.20		
Skaneateles .....						.08		.07	.03		.08	.40	.09	
Ridgeway						1.27	.05	.04		T.		.07	.02	
Demster .....						.16		.04					.20	
Fulton .....						.50	.10			.01		.24	.06	
Oswego .....						.38	.03	.06	.02	.01		.19	.12	
Palermo .....						.03	.08	.10	T.			.04	.25	
Phoenix .....							.40	.12	.06	.05		.16		
Lyons .....					.04	.26		T.			.20	T.		
Rose .....						.55	.10	.06	T.	.01		.25	.15	
Erie, Pennsylvania ..				.01	.01	.72	.44	.10	T.	T.	T.	.31	T.	

TION FOR FEBRUARY—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total.
.10	.....	.....	.....	.....	.15	.....	.03	.....	.....	.....	T.	.....	.....	2.08
.....	.13	.....	.....	.....	.02	.34	.....	.48	.....	.....	.....	.....	.....	2.56
.....	.07	.....	.....	.....	.....	.18	.....	.48	.....	.....	.....	.....	.....	3.09
.....	.....	.....	.....	.....	.22	.....	.41	.....	.....	.....	.....	.....	.....	2.24
T.	0.04	0.00	T.	0.00	0.14	0.06	0.11	0.53	T.	T.	0.00	0.00	T.	2.60
.01	T.	.....	.01	.....	T.	.01	.02	.71	T.	T.	.....	.....	.....	2.05
T.	T.	.....	.....	.....	.....	.....	.....	1.23	.....	.....	.....	.....	T.	2.50
T.	.20	.....	.....	.....	.05	.15	.10	.71	.....	.....	.....	.....	.....	2.61
T.	.....	.....	.....	.....	.20	.....	.42	.46	.....	.....	.....	.....	.....	2.66
.03	.07	.....	.....	.....	.10	.05	.12	.50	.....	.....	.....	.....	.....	2.66
T.	.....	.....	T.	.....	.90	.....	*	+.70	T.	.....	.....	.....	T.	3.28
.....	.....	.....	.....	.....	.....	.20	.....	.65	.....	.....	.....	.....	.....	3.35
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.14
.....	.13	.....	.....	.....	*	+.21	*	+.59	.....	.....	.....	.....	.....	2.76
.....	.....	.....	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....	2.66
.....	T.	.....	.....	.....	.....	.09	.....	.....	.....	.....	.....	.....	.....	2.05
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.43
0.09	0.02	0.01	0.01	0.00	0.19	0.04	0.36	0.08	0.01	0.00	T.	0.00	T.	1.48
.11	.04	.....	.....	.....	.25	.....	.38	.08	.....	.....	.....	.....	.....	1.73
.11	.....	.....	.....	.....	.18	.....	.41	.....	.01	.....	.....	.....	.....	1.44
.06	T.	.04	.04	.....	.....	.14	.....	.20	.02	.....	.....	.....	T.	1.04
.07	.03	.....	.....	.....	.34	.....	.26	.06	.....	.....	.01	.....	.....	1.69
0.05	0.06	0.00	0.01	0.00	0.07	0.10	0.15	0.38	T.	T.	T.	T.	0.00	1.92
.....	.....	.....	.03	.....	.....	.10	.....	.53	T.	.....	.....	.....	.....	1.43
*	+.21	.....	.....	.....	.22	.....	.44	.....	.....	.....	.....	.....	.....	1.86
.10	.12	.....	T.	T.	T.	.19	T.	.58	T.	T.	T.	T.	.....	2.48
0.03	0.03	T.	0.01	0.00	0.02	0.03	0.07	0.24	0.04	0.13	0.07	0.16	0.00	1.73
.19	.....	.....	.....	.....	.....	.....	.07	.05	.11	.04	.....	.48	.....	1.79
.....	.....	T.	.10	.....	.....	.10	.15	.10	.15	.50	.....	.....	.....	1.65
.03	.....	.....	.....	.....	.....	.07	.15	.12	.....	.....	.....	.18	.....	1.02
.....	.12	.....	.....	.....	.14	.....	.15	.15	.....	.20	.....	T.	.....	1.35
.....	.12	T.	T.	.....	*	+.23	*	+.30	.....	.02	.....	T.	.....	1.79
.....	.....	.....	.....	.....	.....	.....	.....	.80	.....	.....	.40	.30	.....	2.80
0.08	0.05	0.02	0.01	T.	0.03	0.02	0.04	0.05	0.01	0.02	0.01	0.05	0.08	1.64
.....	.....	T.	.....	.....	.....	.....	.....	T.	.....	T.	.....	.....	T.	1.59
.38	.10	.....	T.	.....	.01	.06	.09	.08	T.	.01	.01	.03	.05	3.13
.....	.08	.....	.09	.....	.....	.....	.....	.12	.06	.....	.....	.18	.04	1.41
.12	T.	.....	.....	.....	.02	.....	.08	T.	.....	.10	.01	.05	.09	2.45
.11	.12	.03	T.	T.	.01	.03	.03	.04	.01	.11	.07	.01	.13	2.31
?	.05	.02	.....	.....	T.	.03	.06	T.	.....	T.	T.	.....	.08	1.93
*	+.06	.....	.....	.....	.....	.....	.08	.....	.....	T.	T.	.....	.15	1.70
.....	.07	.....	.....	.....	.....	.01	.11	.....	.....	.02	.....	.....	.08	2.07
.10	T.	.....	.10	.....	.31	.....	.....	T.	.....	.....	.....	.....	.05	0.99
.07	.10	.11	.04	.....	.06	.04	.08	.08	.02	.....	.....	.....	.10	1.45
.02	.05	.....	.....	.....	.....	.02	.06	.03	.....	T.	.....	T.	.03	1.66
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.40	.40	1.20
.....	.03	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.20	.....	1.14
.03	.03	.02	T.	T.	.04	.03	.02	.14	T.	T.	T.	.05	.04	1.26
.10	.05	.15	.....	.....	.05	.....	.01	.08	.....	T.	.....	.10	.10	1.14
.....	.11	.09	.....	.....	T.	.09	.....	.17	.....	.....	.....	.....	T.	1.25
.20	.....	.....	T.	.....	T.	.....	T.	.....	.....	.....	.....	.....	.10	.95
.17	.12	.05	.02	.....	.02	.01	.02	.15	.....	T.	.10	.....	.05	1.83
T.	.01	T.	T.	.....	T.	.....	.06	T.	.01	T.	.02	.01	.04	1.74

DAILY AND MONTHLY PRECIPITA

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.00	0.00	0.00	0.00	0.00	0.23	0.10	0.05	T.	0.00	0.00	0.47	0.02	0.00
Fleming.....	.....	.....	.....	.....	.....	.39	.10	T.	.....	.....	.....	.60	.....	.....
Sherwood.....	.....	.....	.....	.....	.....	.30	.15	.14	.01	.....	.....	.28	.....	.....
Watkins.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Romulus.....	.....	.....	.....	.....	.....	.13	.16	T.	.....	.....	.....	.50	.10	.....
Ithaca.....	.....	.....	.....	.....	.....	.20	.....	.05	T.	.....	.....	.50	T.	.....
Average	0.00	0.01	T.	0.01	0.02	0.26	0.22	0.08	0.01	T.	0.02	0.49	0.04	T.

Record for the month incomplete.

|| Received too late to be included in the averages.

TION FOR FEBRUARY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total.
0.01	0.01	0.03	T.	T.	0.02	T.	0.02	T.	0.00	T.	0.08	T.	0.02	1.08
.....	.....	.12	.....	.....	.08	.....	.....	.....	.....	.02	.30	.....	.10	1.40
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.10
.....
.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.93
T.	.05	.01	T.	T.	T.	T.	.10	T.	.....	T.	T.	T.	T.	0.91
0.05	0.04	0.02	0.01	T.	0.07	0.06	0.11	0.22	0.02	0.02	0.02	0.02	0.02	1.86

* Amount included in next measurement.

† Not included in computing averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE — (DEGREES FAHR.).							EXTREMES OF MONTHLY MEAN TEMPERATURE FOR FEBRUARY.			
		Normal for the month of February.	Length of record, years.	Record begins.	Record ends.	Mean for February, 1897.	Departure from the normal.	High-st.	Year.	Lowest.	Year.	
<i>Western Plateau.</i>		24.3	..	.....	.....	26.8	+2.5	.....	.....	.....	.....	.....
Angelica.....	Allegany.....	22.2	15	1855	1897	24.7	+2.5	33.6	1857	13.2	1895	.....
Humphrey.....	Cattaraugus.....	23.7	14	1884	1897	26.8	+3.1	33.2	1890	14.3	1885	.....
Elmira.....	Chemung.....	26.9	20	1851	1897	28.8	+1.9	31.6	1890	16.2	1856	.....
<i>Eastern Plateau.</i>		22.8	..	.....	.....	25.6	+2.3	.....	.....	.....	.....	.....
Oxford.....	Chenango.....	23.1	30	1828	1897	26.2	+3.1	33.7	1828	12.3	1898	.....
Cortland.....	Cortland.....	22.3	34	1829	1897	25.0	+2.7	30.4	1842	13.8	1898	.....
Cooperstown.....	Otsego.....	20.9	44	1854	1897	21.3	+0.4	31.7	1857	10.5	1885	.....
Waverley.....	Tioga.....	24.7	15	1883	1897	27.7	+3.0	32.1	1890	14.8	1885	.....
<i>Northern Plateau.</i>		20.3	..	.....	.....	20.8	+0.5	.....	.....	.....	.....	.....
Lowville.....	Lewis.....	20.3	31	1827	1897	20.8	+0.5	31.1	1828	13.4	1895	.....
<i>Atlantic Coast.</i>		31.0	..	.....	.....	32.1	+1.2	.....	.....	.....	.....	.....
New York City.....	New York.....	31.3	27	1871	1897	33.0	+1.7	40.0	1890	23.1	1885	.....
Setauket.....	Suffolk.....	30.6	12	1886	1897	31.2	+0.6	37.6	1890	24.4	1895	.....
<i>Hudson Valley.</i>		25.9	..	.....	.....	26.3	+0.3	.....	.....	.....	.....	.....
Albany.....	Albany.....	24.5	24	1874	1897	26.0	+1.5	33.0	1884	14.7	1885	.....
Honeymead Brook.....	Dutchess.....	24.8	17	1881	1897	25.2	+0.4	32.6	1890	15.9	1885	.....
West Point.....	Orange.....	28.5	69	1826	1897	27.6	-0.9	.....	.....	.....	.....	.....
<i>Champlain Valley.</i>		18.5	..	.....	.....	17.8	-0.7	.....	.....	.....	.....	.....
Plattsburgh Barracks.	Clinton.....	18.5	44	1839	1897	17.8	-0.7	26.4	1840	7.2	1885	.....
<i>St. Lawrence Valley.</i> ...		18.8	..	.....	.....	19.8	+1.0	.....	.....	.....	.....	.....
Madison Barracks.....	Jefferson.....	20.7	40	1839	1897	20.2	-0.5	30.7	1840	10.1	1875	.....
Canton.....	St. Lawrence.	18.0	35	1862	1897	18.8	+0.8	26.5	1877	6.4	1875	.....
North Hammond.....	"	18.3	19	1867	1897	21.3	+3.0	26.1	1891	10.4	1875	.....
Potsdam.....	"	18.1	30	1828	1897	18.8	+0.7	28.9	1828	9.5	1838	.....
<i>Great Lakes.</i>		24.8	..	.....	.....	26.3	+1.5	.....	.....	.....	.....	.....
Buffalo.....	Erie.....	24.7	27	1871	1897	28.0	+3.3	32.6	1882	12.8	1875	.....
Rochester.....	Monroe.....	24.6	27	1871	1897	27.0	+2.4	32.7	1882	13.7	1885	.....
Fort Niagara.....	Niagara.....	26.2	41	1842	1897	27.6	+1.4	32.5	'77-'80	13.5	1885	.....
Baldwinsville.....	Onondaga.....	24.2	21	1854	1897	25.7	+1.5	29.9	'89-'91	16.8	1855	.....
Oswego.....	Oswego.....	24.5	27	1871	1897	25.0	+0.5	32.4	1882	12.9	1885	.....
Palermo.....	"	22.3	44	1854	1897	23.1	+0.8	28.0	1891	9.8	1885	.....
Erie, Pennsylvania...	Erie.....	27.3	24	1874	1897	28.0	+0.7	36.0	1882	16.0	1875	.....
<i>Central Lakes.</i>		25.3	..	.....	.....	26.9	+1.6	.....	.....	.....	.....	.....
Ithaca.....	Tompkins.....	25.3	19	1879	1897	26.9	+1.6	32.7	1891	15.3	1885	.....
Average departure..		.....	.....	.....	.....	.....	+1.4	.....	.....	.....	.....	.....

AND PRECIPITATION — FEBRUARY.

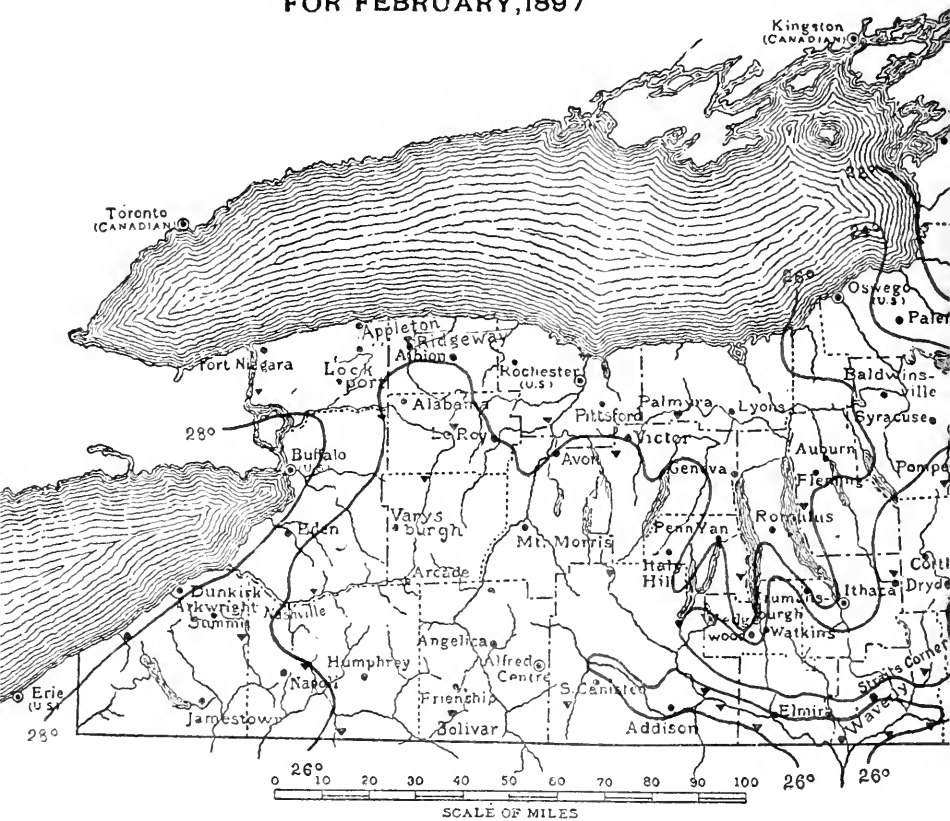
STATION.	COUNTY.	PRECIPITATION — (INCHES.)									
		Average for the month of February.	Length of record, years.	Record begins.	Record ends.	Total for February, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR FEBRUARY.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount	Year.
<i>Western Plateau.</i>		2.25	..	.....		1.69	-0.56	.....	.....	.....	.....
Angelica.....	Allegany.....	1.79	15	1856	1897	1.57	-0.22	4.37	1893	0.10	1875
Humphrey.....	Cattaraugus.....	3.23	14	1884	1897	2.56	-0.67	7.30	1887	1.03	1889
Elmira.....	Chemung.....	1.73	17	1854	1897	0.93	-0.80	3.40	1896	0.25	1856
<i>Eastern Plateau.</i>		2.57	..	.....		1.99	-0.58	.....	.....	.....	.....
Oxford.....	Chenango.....	2.28	27	1829	1897	2.09	-0.19	5.81	1892	0.21	1844
Cortland.....	Cortland.....	2.65	18	1851	1897	1.11	-0.54	5.77	1851	0.97	1895
Cooperstown.....	Otsego.....	2.35	44	1854	1897	2.06	-0.29	5.36	1896	0.60	1856
Port Jervis.....	Orange.....	3.52	14	1880	1897	3.00	-0.52	6.51	1896	1.12	1892
Waverly.....	Tioga.....	2.03	16	1882	1897	1.67	-0.36	4.07	1896	0.75	1882
<i>Northern Plateau.</i>		2.63	..	.....		1.75	-0.88	.....	.....	.....	.....
Lowville.....	Lewis.....	2.64	32	1827	1897	1.75	-0.88	5.71	1831	0.29	1841
<i>Atlantic Coast.</i>		4.02	..	.....		2.64	-1.38	.....	.....	.....	.....
New York City.....	New York.....	3.82	27	1871	1897	2.72	-1.10	7.81	1893	0.82	1895
Setauket.....	Suffolk.....	4.22	12	1886	1897	2.56	-1.66	7.11	1893	0.91	1895
<i>Hudson Valley.</i>		3.21	..	.....		2.76	-0.45	.....	.....	.....	.....
Albany.....	Albany.....	2.69	24	1874	1897	2.05	-0.64	4.63	1892	0.26	1877
Honeymead Brook ..	Dutchess.....	3.05	17	1881	1897	2.61	-0.44	7.43	1893	1.21	1892
Poughkeepsie.....	".....	2.62	22	1830	1897	2.66	+0.04	6.78	1893	0.75	1841
West Point.....	Orange.....	3.43	51	1840	1897	3.35	-0.08	7.29	1893	0.63	1856
Boys Corners.....	Putnam.....	4.27	27	1870	1897	3.14	-1.13	8.41	1896	0.80	1877
<i>Champlain Valley.</i>		1.55	..	.....		1.43	-0.12	.....	.....	.....	.....
Plattsburgh Barracks.	Clinton.....	1.55	39	1840	1897	1.43	-0.12	6.21	1896	0.20	40-'88
<i>St. Lawrence Valley.</i>		2.05	..	.....		1.98	-0.07	.....	.....	.....	.....
Madison Barracks.....	Jefferson.....	1.90	37	1840	1897	1.79	-0.11	5.30	1896	0.20	1873
North Hammond.....	St. Lawrence.....	2.40	20	1866	1897	1.35	-1.05	4.96	1876	0.92	1894
Potsdam.....	".....	1.84	29	1828	1897	2.80	+0.96	6.42	1890	0.03	1830
<i>Great Lakes.</i>		2.64	..	.....		1.88	-0.76	.....	.....	.....	.....
Buffalo.....	Erie.....	2.93	27	1871	1897	3.13	+0.20	5.51	1887	0.46	1877
Rochester.....	Monroe.....	2.81	27	1871	1897	2.31	-0.50	5.40	1876	0.46	1877
Fort Niagara.....	Niagara.....	1.98	39	1842	1897	1.70	-0.28	4.12	1887	0.31	1877
Oswego.....	Oswego.....	2.58	27	1871	1897	1.26	-1.32	4.90	1896	0.22	1877
Palermo.....	".....	2.31	38	1860	1897	1.14	-1.17	7.20	1866	0.10	1877
Erie, Pennsylvania....	Erie.....	3.24	24	1874	1897	1.74	-1.50	8.50	1887	0.33	1877
<i>Central Lakes.</i>		2.09	..	.....		0.91	-1.18	.....	.....	.....	.....
Ithaca.....	Tompkins.....	2.09	19	1879	1897	0.91	-1.18	4.61	1896	0.63	1886
Average departure..		.....	.....	.....	.....	.....	-0.61	.....	.....	.....	.....

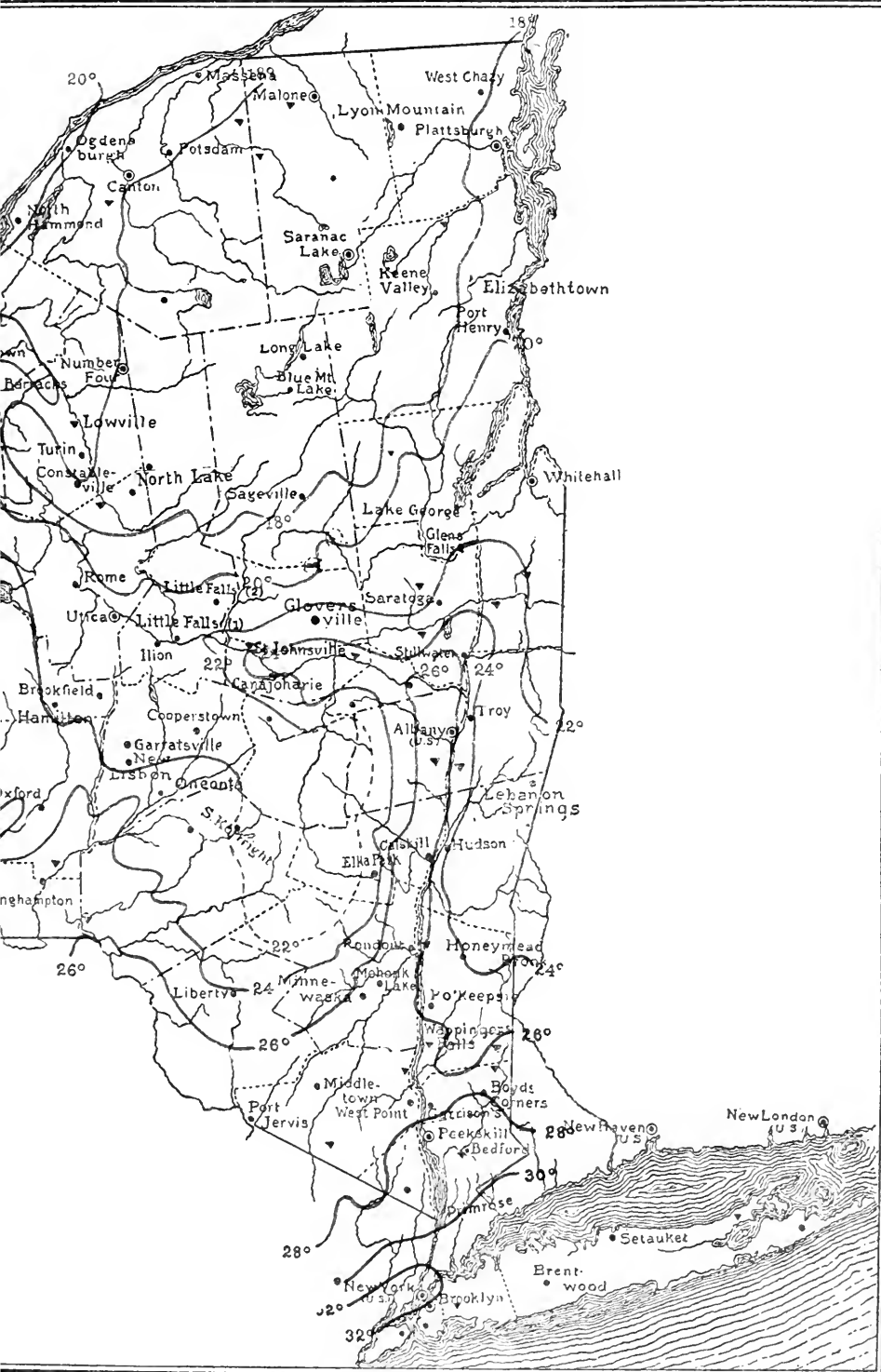
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR FEBRUARY, 1897





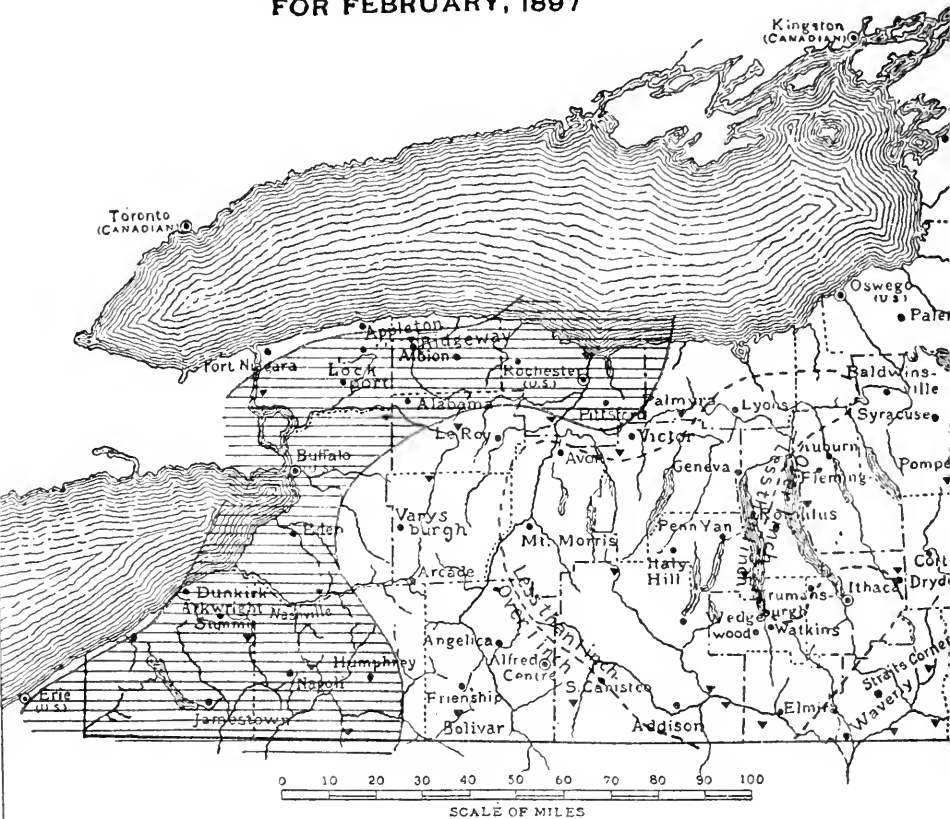


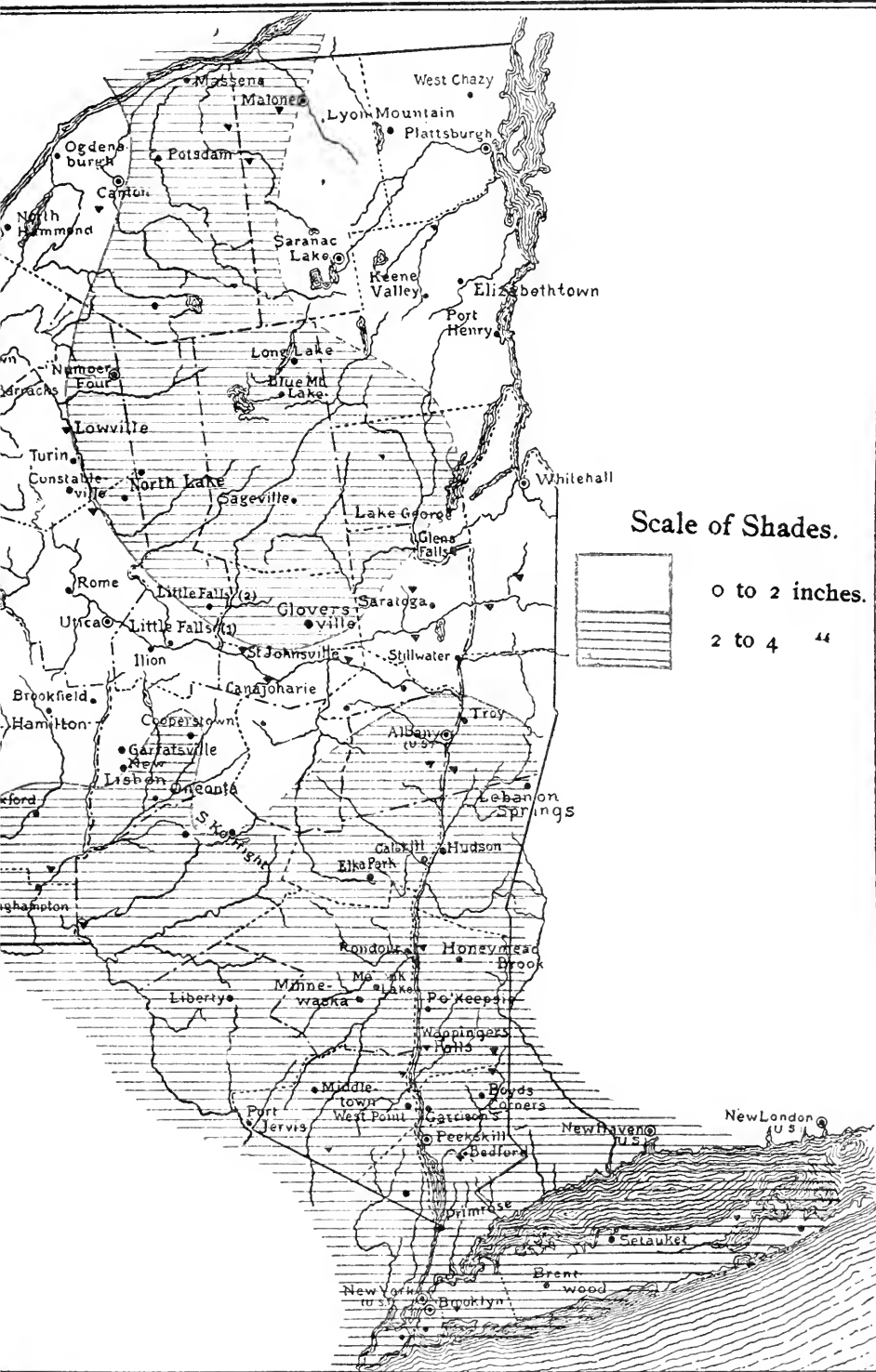
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR FEBRUARY, 1897





Meteorological Summary for March, 1897.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York, during the month of March, was 30.07 inches. The highest barometer was 30.87 inches at Albany on the 1st, and the lowest was 29.17 inches at Ithaca and Oswego on the 24th. The mean pressure was highest in eastern and southeastern New York, and lowest along the Great Lakes. The average pressure at six stations of the National Bureau was 0.04 inches above the normal, excesses obtaining at all stations.

The mean temperature of the State was 32.9 degrees, as derived from the records of 77 stations; the highest monthly mean being 39.7 degrees at Brooklyn, and the lowest 26.5 degrees at Number Four. The highest daily mean for the State was 44 degrees on the 20th, and the lowest was 15 degrees on the 1st. The maximum temperature reported was 70 degrees at Addison on the 22d, the minimum being 25 degrees below zero at North Lake on the 1st. The mean monthly range of temperature for the State was 60 degrees; the greatest range, 79 degrees, occurring at North Lake and the least, 42 degrees, at Setauket and Brooklyn. The mean daily range was 18 degrees; the greatest daily range being 51 degrees at Saranac Lake on the 1st, and the least, 2 degrees, at Buffalo, on the 25th. The mean temperatures of the several regions was as follows: The Western Plateau, 34.3 degrees; the Eastern Plateau, 33.2 degrees; the Northern Plateau, 28.3 degrees; the Atlantic Coast Region, 38.6 degrees; the Hudson Valley, 35.2 degrees; the Mohawk Valley, 30.4 degrees; the Champlain Valley,

30.1 degrees; the St. Lawrence Valley, 29.7 degrees; the Great Lake Region, 34.3 degrees; the Central Lake Region, 35.0 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 3.0 degrees above the normal, excesses being reported from all stations excepting Potsdam.

The mean relative humidity for the State was 75 per cent. The mean dew point was 27 degrees.

The average precipitation for the State, as derived from the records of 102 stations, was 3.40 inches of rain and melted snow. The maximum general precipitation, ranging from 4 to 7 inches, obtained over much of the territory extending from Lake Ontario and the St. Lawrence river to the Upper Hudson Valley. The greatest local precipitation was 7.20 inches at North Lake, and the least was 1.55 inches at Cortland. The average snowfall at 65 widely distributed stations was 7.7 inches. The amounts in the central and southern valleys and coast generally did not exceed 2 inches. In northern New York amounts ranging from 15 to 28 inches were commonly reported, while for the Central Plateau the maximum amount was 17 inches. The average precipitation at 27 stations possessing records for previous years, was 0.22 inches above the normal amount. The rainfall was deficient in much of eastern and southern New York, excesses being more common in the north and west.

The average number of days on which the precipitation amounted to 0.01 inches or more was 12.1. The storm frequency was more uniform than usual over the State, although somewhat greater in northern and eastern New York and the Great Lake Region than elsewhere. The average number of clear days was 9.7; of partly cloudy days, 7.6; and of cloudy days, 13.7; giving an average cloudiness of 57 per cent. The cloudiness was least in the vicinity of the Western Plateau and the Atlantic Coast.

The prevailing wind direction was from the west. The average wind travel at 6 stations of the National Bureau was 10,261 miles. The mileage being generally greater than the average for March of previous years. The maximum velocity reported from the above stations was 76 miles per hour at Buffalo on the 12th.

Lightning was observed at 3 stations of the Coast Region on the 3d. On the 12th a thunderstorm was reported from North Hammond. On the 20th, thunderstorms were reported from 32 stations in nearly all sections of the State. The main disturbance appears to have been extensive, beginning at the western border early in the morning, moving eastward over the State at the rate of about 30 miles per hour. On the 21st a thunderstorm occurred at Westfield, on the 22d at 9 stations between Lake Erie and the eastern border; and on the 24th at Ithaca and Manhattan Beach.

Hail fell on the 5th, 8th, 12th, 14th, 20th; and sleet fell on the 2d, 5th, 8th, 9th, 13th, 14th and 24th.

Auroras were observed on the 4th, 7th, 28th and 31st; Solar halos on the 13th, 17th and 20th. Lunar halos on the 11th, 12th, 13th, 17th and 18th.

GENERAL FEATURES OF THE WEATHER.

After the cloudy weather with which the month opened, a large proportion of fair or clear days obtained, much of the precipitation occurring during brief storms or squalls. The temperature was well above the normal the greater part of the month, considerable deficiencies being noted only for short periods about the 1st, 7th and 16th. The range of temperature was large, values varying from 25 degrees below zero in northern New York on the 1st, to a maximum of 70 degrees in the south during the warm wave of the third week. The precipitation was slightly in excess for the State, but heavy only over a small portion of northern New

York, while through much of the central section it was quite light. Strong winds prevailed almost continuously during the first half of March, and also from the 24th to the 28th.—A considerable snow-fall occurred over the northern and portions of the central highlands, but remained on the ground only a very brief time.

Eight areas, each of high and low pressure, influenced our weather conditions this month; the storm frequency being rather above the usual average during the first half of the month and much below it during the latter half. The depressions were, with two exceptions, well developed cyclonic areas following the winter storm track from the Southern or Southeastern States toward the northeast. The anticyclonic areas also were generally well defined and with high central pressures.

The following is a brief account of the pressure systems of March:

High I, 30.9 inches over the New England States on the 1st. A cold wave and light general snows. Much warmer with advance of

Low I, 29.9 inches moving eastward over New York and Canada on the 2d, moderate rain on the coast, snow elsewhere, with strong winds.

Low II, 29.7 inches. A cyclone developing in Arkansas, passing over Lower Lakes and St. Lawrence Valley, bringing still warmer weather and general rains, heaviest in the north. Strong winds reaching a gale with advance of

Highs II (30.5 inches) and III (30.4 inches) moving eastward respectively along the northern border and from the Central States on the 3d and 4th. Cooler, fair excepting scattering snows.

Low III, 29.6 inches, a cyclone advancing from the Mississippi Valley, central north of New York on 5th to 6th, giving moderate rain in the southeast, snow elsewhere.

High IV, 30.9 inches, moving from the Central States over New York on the 7th. Considerably colder, fair until the 9th.

Low IV, 29.5 inches, passing from the central valleys to our northern border on the 9th and 10th. Much warmer, southeast gales, general rain, maximum in the north and west.

High V, 30.1 inches, developed on the central coast, moving slowly northward on 11th and 12th. Fair and mild on the 11th.

Low V, 29.3 inches, a severe cyclone, moving from the southwest to the Upper Lakes and over Canada on the 12th and 13th. Gales, velocity of 76 miles per hour at Buffalo. Snow in extreme north, moderate rain elsewhere.

High VI, 30.3 inches, spreading eastward from a general high area in the northwest. Fair, much colder, on the 13th.

Low VI, 29.5 inches, originating in the Southwestern States. Passed eastward near the lakes and Northern New York on the 14th. Continued gales with a moderate snowfall, maximum in eastern and northern sections.

High VII, 30.8 inches, spread from Gulf States to central coast on the 15th, and, with VI, covered the Northeastern States until the 18th. Generally fair cold weather, followed by a warm wave on the 18th.

Low VII, an energetic cyclone over the Upper Lakes on the 20th, diminishing to 29.7 inches and spreading over Canada on the 21st. Continued warm weather and scattering showers.

Low VIII, 29.3 inches, moved northeast to the Ohio Valley on the 22d, spreading and increasing over the Northeastern States on the 24th and 25th, general rains on the 23d and 24th, heaviest in central New York. Also moderate snows on the plateaus, lakes and coast on the 25th.

High VIII, 30.4 inches, covered the Northern-central States on the 27th, afterward lingering over the coast States until the end of

the month, giving fair weather, with temperatures slightly below the normal on the 27th and 28th.

Ice in Rivers, etc., from statements of observers at the following points: Albany: Navigation opened on the Hudson, between New York and Newburg and Poughkeepsie on the 2d. Ice jams occurred on the upper Hudson, on the 6th and 9th; and on the 16th the first boat reached Albany from New York. On the 11th the Mohawk river was practically clear of ice from Fonda to its mouth. Jamestown: On the 12th ice broke up in Chautauqua lake, causing some damage along shores; and on the 24th the lake was clear of ice. South Canisteo reports a freshet in the Canisteo river on the 30th. Binghamton: Ice broke up in the Susquehanna on the 4th and went out on the 6th.

Advance of Vegetation, Migration of Birds, etc., reported by observers at the following stations: Alfred: Alders and snowdrops blossomed on the 22d, crocus on the 30th. First insects, 20th. Angelica: First robins on the 10th. Franklinville: First robins on the 8th; grasshoppers numerous on the 13th. Humphrey: Blue jays appeared on the 3d; robins on the 10th; blue birds on the 12th; Phoebe birds on the 22d. Jamestown: Robins appeared on the 8th. Wedgewood: Bluebirds and robins appeared on the 9th; larks on the 17th. South Canisteo: Grasshoppers were abundant about the 21st. Waverly: Blackbirds appeared on the 24th. Lebanon Springs: Robins and bluebirds appeared on the 8th; song-sparrows on the 19th. Lake George: Robins appeared on the 12th; bluebirds on 22d; song-sparrows and red-wing blackbirds on 23d. Appleton: Robins appeared on the 8th.

Heavy gales prevailed on the 12th and 14th, causing considerable damage on the latter date. During the thunderstorm of the 20th, lightning struck the house, barn and shop of the observer at Lowville.

Frost began coming out of the ground after the first week, and

by the 27th, the ground was generally free from frost in nearly all parts of the State. Some plowing was done in sheltered parts of the southern tier by the 12th. Alternate thawing and freezing of the soil was reported by a few observers to have caused some damage to winter wheat.

Mr. L. W. Chamberlin, observer at Gloversville, on the 2d observed a fall of dark colored snow, and on melting a portion, found a deposit of soil and vegetable matter. Mr. Chamberlin believes this dust was carried into the upper strata by the gales of the preceding day.

FOR MARCH, 1897.

THERMOMETER — (IN DEGREES FAHR.)										SKY.		PRECIPITATION — (INCHES)					Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	Duration.	Date.	Total snowfall.	
-10	1	66	20	43	18	3	25	9.5	10.1	11.4	12.4	2.94	1.10	<i>h. m.</i>	2	.....	.....
-8	1	73	20	41	1	7	2	5	13	13	14	3.24	0.98	.....	24	7.4	W.
-6	1	73	20	39	22	4	12	9	11	11	14	4.21	0.68	.....	23	10.5	.....
-3	1	70	22	40	22	10	<i>y</i>	9	11	11	15	3.37	0.37	.....	23	5.0	S. W.
-4	1	73	22	39	1	9	8	8	12	11	12	2.59	0.38	.....	3	6.5	W.
-5	1	69	18	38	1	9	<i>aa</i>	8	7	16	19	3.04	0.39	4.00	20	10.0	S. W.
5	1	69	20	35	29	6	25	6	9	16	14	2.19	0.40	.....	3	12.7	S. W.
9	1	59	16	29	18	3	25	6	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	1	56	19	33	17	5	25	6	16	9	16	5.52	1.10	.....	2	17.0	S. W.
2	1	62	20	32	17	9	24	17	0	14	7	2.41	0.72	.....	20	.....	N. W.
-10	1	78	20	43	18	8	14	8	12	11	8	1.87	0.52	.....	20	.....	.....
2	1	62	17	32	17	8	<i>ab</i>	14	12	5	8	2.70	0.90	.....	4	1.0	W.
.....
1	1	66	21	39	17	8	25	7	18	6	12	2.54	0.55	.....	24	3.0	N. W.
2	1	65	19	38	22	8	25	14	7	10	17	2.29	0.62	.....	24	2.0	S. W.
-3	1	73	23	42	22	7	16	11	5	15	11	3.01	0.83	16.00	23-24	4.0	N. W.
0	1	64	19	38	17	6	25	7	12	12	14	2.80	0.61	.....	3	9.0	.....
-10	1	63	19	41	22	4	20	9.9	7.9	13.2	13.3	2.92	1.10	.....	24	.....	.....
-2	1	67	19	35	22	8	<i>ac</i>	8	9	14	14	2.92	0.64	.....	24	6.2	S. E.
2	1	63	19	35	22	5	4	10	5	16	17	2.66	0.78	.....	20	4.9	W.
-3	1	63	22	37	17	12	<i>ad</i>	8	11	12	17	4.08	0.97	.....	20	8.5	W.
5	17	60	19	35	<i>m</i>	8	18	10	9	12	15	1.55	0.27	.....	24	.....	N.
-6	1	65	22	34	22	11	25	.....	.....	.....	8	2.59	0.74	.....	20	.....	.....
.....
9	1	56	18	34	<i>p</i>	4	20	14	10	7	12	2.74	0.66	.....	17	2.0	N. W.
-7	1	58	16	35	1	6	<i>z</i>	14	6	11	14	3.31	0.86	.....	20	9.0	N.
-10	1	69	20	37	17	8	26	7	7	17	17	2.90	0.82	21.00	20	13.8	S.
-3	1	67	22	39	30	10	25	6	.....	.....	10	3.50	0.74	.....	19	.....	.....
6	<i>h</i>	61	19	41	22	6	25	6	13	12	15	2.66	1.03	.....	24	5.1	N. W.
-3	1	66	18	36	17	9	<i>ae</i>	13	3	15	15	2.82	1.07	.....	22-23	3.9	N.
0	1	68	22	37	22	6	2	9	11	11	14	1.89	0.52	.....	20	0.8	N. W.
-1	1	66	19	36	<i>m</i>	7	25	.....	.....	.....	10	3.37	1.10	.....	24	0.2	W.
4	1	59	14	24	17	5	12	10	3	18	8	4.00	1.00	.....	19-20	8.0	N. W.
-25	1	67	20	51	1	4	19	7.3	7.2	16.5	15.3	4.86	2.10	.....	3	.....	.....
-20	1	72	24	51	1	5	21	10	6	15	18	2.70	0.53	.....	9	9.5	W.
-9	1	62	16	32	17	5	<i>af</i>	11	3	17	16	5.41	1.15	17.45	20	19.3	W.
1	<i>j</i>	48	20	34	<i>n</i>	5	<i>af</i>	2	7	22	14	6.66	1.20	.....	9	27.5	W.
-25	1	79	22	44	18	6	26	10	6	15	12	7.20	2.10	.....	3	28.0	W.
-22	1	75	19	42	1	4	19	6	15	10	18	2.97	0.50	.....	14	10.6	W.
-16	1	67	19	39	1	6	<i>bb</i>	5	6	20	14	4.25	0.80	13.00	3	18.9	S.
10	1	48	17	39	30	4	19	11.1	6.7	13.2	11.4	3.18	1.00	15.00	12	.....	.....
18	<i>j</i>	42	15	26	<i>q</i>	5	18	9	6	16	11	3.63	0.74	14.00	14	2.0	W.
18	<i>k</i>	44	14	26	<i>r</i>	4	19	11	6	14	12	2.84	0.62	.....	20	2.0	N. W.
16	1	46	14	28	17	5	18	10	7	14	13	2.51	0.55	.....	20	2.2	N. W.
13	4	51	18	32	3	7	18	.....	.....	.....	11	3.70	0.82	11.00	14	T	N. E.
14	1	53	21	39	30	7	3	16	1	14	10	4.40	1.00	15.00	12	2.0	N. W.

FOR MARCH, 1897—(Continued).

TEMPERATURE—(IN DEGREES FAHR.).							SKY			PRECIPITATION—(INCHES).					Prevailing direction of wind.		
Lowest	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.		Date.	Total snowfall.
17	1	42	15	24	30	5	20	10	11	10	10	2.80	0.78	<i>h. m.</i> 16.00	24	1.5	W.
10	1	58	19	33	23	5	20	11	9	11	13	2.72	0.71	16.00	24	4.7	N. W.
13	1	50	18	34	11	6	20	11	7	13	11	2.83	0.68	.....	19	3.5	.....
-9	1	56	19	35	30	3	9	9.3	6.0	15.7	10.4	2.73	1.00	.....	24	.....	.....
4	1	54	17	28	6	6	20	10	5	16	14	1.85	0.76	.....	20	2.6	S.
-9	1	64	20	33	16	7	25	6	8	17	9	2.88	0.70	12.00	20	4.5	W.
4	1	57	18	33	22	7	<i>bc</i>	7	9	15	12	2.56	0.64	.....	20	5.7	N.
5	1	56	22	35	30	10	25	8	7	16	9	3.00	0.81	.....	20	7.5	W.
8	<i>h</i>	53	19	35	30	6	20	11	7	13	10	2.79	0.97	24.00	19-20	4.2	W.
4	1	56	18	24	29	5	<i>bd</i>	10	3	18	7	2.05	1.00	.....	24	4.0	S.
11	1	50	18	29	31	3	9	.....	.....	.....	11	3.35	0.80	10.00	24	5.5	N.
7	1	56	17	28	22	6	25	13	3	15	11	3.24	0.91	.....	24	6.5	.....
-3	1	51	16	37	21	3	30	13.3	3.0	14.7	13.5	3.74	0.96	19.30	8-9	.....	.....
2	16	49	16	37	21	4	20	14	0	17	11	4.46	0.96	19.30	8-9	14.5	W.
0	1	53	16	26	8	5	<i>bc</i>	14	4	13	10	3.08	0.53	.....	21	2.0	E.
-3	1	55	16	30	17	4	26	12	5	14	17	2.54	0.42	.....	20	7.9	W.
5	1	46	16	31	12	3	30	.....	.....	.....	16	4.90	0.90	.....	9	.....	.....
-12	1	65	18	42	2	5	21	11.0	3.5	16.5	10.7	3.52	0.95	.....	20-21	.....	.....
-12	1	64	17	42	2	5	21	.....	.....	.....	10	2.26	0.84	.....	25	14.8	W.
-4	1	60	17	32	18	8	<i>bc</i>	11	2	18	11	4.32	0.95	.....	20-21	15.5	W.
-10	1	72	21	38	30	7	9	11	5	15	11	3.97	0.88	18.00	3	13.8	N. W.
-15	1	60	17	48	1	4	<i>cc</i>	9.2	9.8	12.0	10.6	3.99	1.00	3.00	5	.....	.....
-15	1	70	17	39	1	5	10	.....	.....	.....	10	2.41	0.50	.....	10	3.3	S. W.
6	1	53	18	32	1	4	17	9	12	10	10	3.60	0.77	8.00	10	.....	S. W.
-13	1	64	18	48	1	6	<i>cf</i>	9	15	7	.....	.....	.....	.....	.....	.....	S. W.
-6	1	60	15	42	1	4	<i>cd</i>	1	10	20	17	4.82	0.76	.....	5	10.0	W.
-8	1	57	17	36	1	6	11	14	5	12	10	4.18	1.00	3.00	5	26.5	S. W.
-10	1	58	17	40	1	6	24	13	7	11	6	2.70	0.70	.....	25	14.0	S. W.
-9	1	59	16	43	1	2	25	9.4	8.3	13.3	13.3	3.21	1.36	19.00	9-10	.....	.....
5	1	56	18	40	12	5	<i>z</i>	11	7	13	4	1.84	0.96	.....	14	.....	N. W.
4	1	55	15	36	1	2	25	9	12	10	14	3.54	0.88	.....	20	.....	W.
2	1	55	17	36	1	4	27	8	5	18	15	3.32	1.05	.....	20	.....	W.
3	1	60	16	36	1	6	<i>ce</i>	8	12	11	20	3.14	0.67	.....	20	8.1	S. W.
-7	1	67	15	43	1	5	25	7	11	13	12	2.93	0.75	.....	20	2.5	W.
3	1	59	15	33	1	5	25	.....	.....	.....	9	2.50	0.60	.....	20	.....	W.
2	1	57	18	34	1	6	9	13	3	15	13	5.13	1.00	.....	25	13.0	.....
-1	1	62	16	37	1	5	25	10	14	7	12	2.66	0.84	.....	20	4.4	S. W.
0	1	56	14	36	1	3	26	8	6	17	18	4.19	0.88	.....	20	7.6	S. E.
-9	1	66	16	39	1	3	26	13	5	13	15	4.15	1.36	19.00	9-10	4.4	S. W.
0	1	62	15	37	1	5	25	10	9	12	11	2.37	0.65	.....	19-23	2.0	N. W.
7	1	53	15	35	1	3	25	6	8	17	17	2.79	0.48	.....	9	.....	W.
3	1	61	18	36	<i>u</i>	6	4	7.0	3.7	10.3	10.0	3.02	1.18	22.10	24	.....	.....
6	1	56	18	36	<i>v</i>	9	26	3	25	3	7	2.19	0.66	.....	20	4.0	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA-			
STATION.	COUNTY.	Elevation, feet	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Central Lakes (Con.)</i>														
Romulus.....	Seneca	719 .....	.....	.....	..	.....	.....	.....	76	25	....	35.8	66	22
Ithaca.....	Tompkins....	810	30.06	30.77	1	29.17	24	1.60	68	24	33.8	34.8	68	22
Mean.....	.....	....	30.07	30.87	1	29.17	24	1.50	75	27	....	32.9	70	22

* Mean of the tri-daily observations. ; Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m.) ÷ 4, (1) Voluntary observer. (2) United States Weather Bureau. (1a) City Reservoir; (2a) Intake (a) 20, 22; (b) 22, 23; (c) 19, 22, 23, 30; (d) 23, 30; (e) 21, 21; (f) 19, 23; (g) 12, 20; (h) 1, 7; (j) 30; (u) 6, 7, 22; (v) 6, 7; (w) 6, 22; (x) 15, 25; (y) 2, 26; (z) 25, 26; (aa) 14, 24; (ab) 6, 16; (ac) 4, (bf) 9, 25; (cc) 17, 20, 21; (cd) 20, 21; (ce) 16, 26; (cf) 9, 24.

FOR MARCH, 1897 — (*Continued*).

TURE — (IN DEGREES FAHR.).											SKY.		PRECIPITATION — (INCHES).						Prevailing direction of wind.	
Lowest.	Date.	Monthly range.		Mean daily range.		Greatest daily range.		Date.	Least daily range.		Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rain fall.	† Duration.		Date.	Total snow fall.
4 3	1 1	62 65	19 17	33 36	<i>w</i> 32	9 6	4 4	9 9	5 11	17 11	10 13	3.80 3.04	1.18 0.78	<i>h. m.</i> 22.10 14.00	24 24	4.8 3.6	N. W. W.			
-25	1	60	18	51	1	2	25	9.7	7.6	13.7	12.1	3.04	2.10	.....	• 3	7.7	W.		

Thermograph. || Report received too late to be used in computing means. The means from the † Blank indicates that the duration is not shown in the original records, but is within 24 hours. conduit, nine miles north of city.

1, 4; (*k*) 1, 2, 17; (*l*) 3, 7; (*m*) 17, 22; (*n*) 1, 6; (*p*) 17, 30; (*q*) 11, 17; (*r*) 7, 22; (*s*) 1, 6, 17; (*t*) 3, 18, 20; (*ad*) 9, 10; (*ae*) 18, 15, 25; (*af*) 9, 20; (*bb*) 21, 24, 26; (*bc*) 20, 24; (*bd*) 20, 25; (*be*) 9, 19, 20;

TEMPERATURE—MARCH, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	16	31	35	26	36	30	24	33	41	39	38	42	24	31
Alfred	32	36	44	36	47	47	34	40	47	46	47	54	29	41
—8	23	21	17	26	13	8	24	33	31	29	28	14	21	
Angelica	28	28	45	30	47	44	35	43	49	41	50	57	27	38
—6	24	22	17	24	14	9	24	35	30	28	27	15	19	
Bolivar	34	37	48	33	47	33	38	40	49	48	50	58	34	40
—3	27	23	17	22	15	10	24	33	33	24	28	16	24	
Friendship	35	38	50	40	49	50	41	42	50	48	50	56	33	41
—4	20	24	18	23	15	11	25	35	32	30	27	17	25	
Franklinville	33	36	37	39	41	48	35	41	47	42	42	55	30	37
—5	24	24	15	23	18	15	25	31	32	30	30	14	28	
Humphrey	35	35	46	38	48	48	37	39	46	46	47	56	33	37
5	25	21	16	27	14	9	24	33	31	30	25	15	23	
Arkwright														
Jamestown	39	38	47	35	49	48	48	50	49	52	46	57	31	37
10	28	24	18	32	22	15	30	38	32	30	29	19	23	
Elmira	32	39	54	36	43	49	38	40	44	45	53	55	38	45
2	22	20	24	26	18	10	13	31	35	28	35	22	20	
Avon	32	37	46	32	47	52	31	49	55	47	44	55	34	37
—10	23	24	22	23	17	13	13	38	34	29	37	16	29	
Mount Morris														
Lockport	32	39	43	34	51	26	32	51	52	48	46	54	35	43
2	24	25	22	36	18	17	23	40	33	31	31	12	20	
Wedgewood	30	37	48	34	39	45	37	41	42	44	49	55	32	37
1	23	24	19	23	12	6	21	29	30	27	28	16	18	
Addison	35	39	51	35	43	46	35	43	44	46	52	53	33	44
2	28	28	22	26	18	11	24	32	32	25	33	20	23	
South Canisteo	35	40	52	32	48	50	35	42	48	48	49	55	33	42
—3	27	25	18	22	16	9	22	32	28	26	29	17	30	
Arcade	36	36	45	29	46	46	32	42	48	47	42	54	25	32
0	22	21	15	24	11	9	25	36	29	27	25	13	23	
<i>Eastern Plateau...</i>	14	31	39	27	30	31	21	29	36	40	38	39	28	28
Binghamton (1).....	32	39	53	30	42	36	37	38	42	49	50	51	36	40
—2	30	29	22	29	19	12	21	28	32	26	29	19	20	
Binghamton (2).....	36	39	53	29	48	49	33	40	42	50	51	52	32	40
2	28	26	24	24	15	11	22	32	32	29	32	20	21	
Oxford	25	35	43	32	38	42	33	41	40	42	46	47	41	40
—3	19	23	18	15	17	7	15	28	30	22	25	15	16	
Cortland	18	38	49	45	49	45	30	45	42	45	45	50	53	34
10	21	24	20	20	23	10	21	30	30	30	30	37	19	
South Kortright... ..	25	38	47	37	41	46	33	43	49	49	45	48	45	37
—6	22	27	16	13	22	11	12	28	32	25	25	15	14	
Middletown														
Port Jervis	23	46	49	40	37	41	31	36	42	55	56	50	40	38
9	22	33	26	21	29	15	15	42	30	36	25	33	26	22
Cooperstown	28	35	45	30	39	39	27	42	42	42	43	45	33	33
—7	28	28	17	15	18	11	12	32	32	28	28	15	16	
New Lisbon	25	36	46	30	38	44	30	39	40	43	44	45	33	35
—10	24	25	11	9	20	7	12	28	31	26	25	15	14	
Oneonta	32	40	50	34	45	47	38	44	47	49	51	54	38	40
—3	15	30	20	16	23	14	16	31	36	30	29	19	20	
Perry City	29	30	46	31	42	41	30	41	44	46	47	52	30	37
6	21	25	20	19	14	6	17	30	33	26	25	10	19	
Straits Corners	30	35	50	34	38	40	34	38	41	42	51	49	31	39
—3	25	30	20	21	17	9	20	30	33	24	31	20	21	
Waverly	31	35	57	37	44	44	38	41	43	48	56	52	34	50
0	29	35	23	23	20	10	20	32	30	23	30	22	22	
Dryden	32	38	49	29	46	47	34	43	41	48	46	51	32	37
—1	25	26	21	20	13	8	21	31	30	30	31	17	18	
Mohonk Lake	22	38	43	34	34	40	26	30	35	45	47	39	39	30
4	28	34	20	24	20	12	18	28	32	32	34	20	21	

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
25	19	29	40	49	53	44	47	42	37	29	29	27	30	36	47	38	34.3
25	25	45	46	55	64	52	65	52	41	28	30	31	37	53	59	46	33.0
18	8	11	32	40	40	36	31	32	28	22	21	18	19	21	33	26	
28	28	47	50	59	66	50	67	47	40	33	37	31	36	49	59	48	33.0
10	2	10	35	39	40	35	28	34	32	25	23	20	17	19	35	23	
32	26	48	48	60	66	54	67	59	45	34	33	35	38	53	60	48	
19	11	10	34	38	44	37	27	33	28	22	23	15	20	17	34	22	34.2
33	33	50	49	61	66	54	69	54	43	32	33	37	40	54	60	48	35.6
20	12	15	35	41	42	35	32	32	29	23	24	20	25	22	35	25	
28	27	44	48	56	62	52	64	51	41	32	29	33	36	50	59	51	33.1
18	3	9	35	39	44	37	29	30	32	18	22	15	19	18	34	19	
31	34	42	49	56	63	52	62	51	40	28	32	32	40	55	65	54	34.1
18	9	17	34	33	43	35	37	30	27	22	22	15	19	20	37	31	
30	32	48	50	60	66	51	60	52	44	29	31	34	36	52	59	52	33.0
20	14	19	36	39	45	38	35	31	28	24	24	19	22	22	37	31	36.2
41	31	45	45	54	64	50	64	55	45	47	38	38	45	54	56	51	
18	17	13	31	39	43	40	33	36	36	29	27	24	28	25	45	30	36.5
31	26	33	53	63	68	49	54	53	44	40	37	38	38	40	56	50	
20	9	9	10	40	43	39	27	29	34	31	28	27	25	22	31	22	34.6
32	24	48	53	56	64	53	53	42	47	37	37	40	37	47	54	47	35.3
19	16	15	34	29	39	28	34	32	32	28	27	27	26	26	33	31	
35	28	46	46	51	65	54	67	53	43	32	37	37	42	52	58	47	33.6
18	10	7	33	39	40	36	32	31	30	24	23	20	21	21	31	29	
36	29	48	45	57	67	57	67	53	45	36	38	38	42	53	60	50	36.1
24	15	12	35	39	43	39	29	36	34	28	28	22	26	23	36	26	
33	29	49	55	57	66	55	70	54	46	37	37	38	41	52	61	51	
20	12	10	31	37	39	33	28	31	31	25	24	19	18	17	32	21	34.8
26	23	46	49	57	61	46	64	50	39	28	30	34	32	46	55	44	
17	6	8	35	38	42	36	33	29	27	22	18	11	13	17	35	28	32.0
27	19	23	36	45	45	42	45	45	39	30	31	31	31	36	42	37	35.2
37	36	42	41	58	53	53	65	58	47	35	36	35	39	49	49	51	34.4
15	14	10	33	37	41	35	30	35	35	19	25	25	26	23	29	26	
34	22	42	41	56	53	53	65	56	47	33	35	33	37	49	55	48	35.0
21	13	10	35	39	44	36	30	33	32	26	26	25	26	24	30	27	
36	29	40	40	55	52	48	60	55	44	38	41	40	41	47	54	48	31.4
17	3	3	25	32	37	32	25	30	30	25	23	20	20	18	24	22	
37	29	46	42	55	52	51	65	55	55	35	37	35	36	41	54	48	33.8
17	8	5	34	37	42	37	30	32	30	25	23	21	21	32	29	24	
33	34	28	43	58	52	48	59	54	44	35	37	40	37	45	50	46	31.7
16	9	1	25	33	38	34	25	27	30	24	22	20	20	17	21	22	
41	36	48	42	57	55	59	49	49	49	39	41	43	52	59	54	54	
13	20	35	40	37	33	38	36	36	36	29	26	28	28	32	31	31	
37	32	44	47	44	60	53	60	46	39	41	42	47	57	65	57	57	36.0
21	18	10	34	29	40	38	29	42	38	31	28	23	27	25	31	27	
29	22	32	40	44	45	41	51	51	42	33	31	36	37	42	47	47	30.3
20	6	0	24	35	36	33	30	31	33	27	25	26	20	22	25	26	
32	19	36	39	54	49	43	59	54	40	33	32	37	37	45	52	45	29.9
19	5	-1	26	34	37	30	24	31	31	24	24	24	15	17	22	20	
35	29	43	45	59	55	52	62	60	46	38	38	40	43	52	64	52	35.0
22	10	6	29	37	41	35	28	33	35	28	27	25	20	23	25	25	
35	24	42	48	57	57	50	67	52	46	33	36	35	38	46	57	41	32.6
19	10	16	30	36	40	31	26	38	32	27	26	22	25	17	27	21	
30	29	43	42	55	55	51	63	55	44	35	36	35	41	51	60	50	33.4
21	13	7	31	36	35	31	42	33	32	26	25	29	23	19	30	26	
38	32	46	44	55	60	59	65	68	48	36	41	48	43	55	65	55	36.4
24	15	10	33	40	41	37	28	33	34	28	24	22	24	20	32	23	
30	21	43	45	57	55	48	65	55	45	33	34	35	37	45	54	45	33.1
20	6	7	35	39	41	30	29	29	32	26	24	23	22	29	27	23	
33	24	33	34	47	43	50	51	52	45	35	36	37	42	48	54	48	32.4
22	12	9	28	34	35	33	33	40	32	27	26	23	26	27	31	33	

TEMPERATURE — MARCH, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau...</i>	6	28	31	20	27	24	15	23	32	35	32	30	21	22
<i>Saranac Lake.....</i>	31	41	45	32	43	43	30	41	44	46	39	46	20	32
	-20	16	14	11	20	4	3	10	29	27	21	4	4	11
<i>Gloversville</i>	20	37	42	30	33	45	26	32	34	41	42	40	34	33
	-9	20	26	19	8	20	7	8	29	32	28	27	14	14
<i>Little Falls (2a)...</i>	35	36	42	27	41	38	29	36	36	40	40	41	31	32
	1	25	11	1	21	4	2	9	31	19	19	12	11	15
<i>North Lake.....</i>	25	24	23	15	1	24	-4	2	43	39	41	38	44	21
	20	33	44	31	37	44	32	26	37	43	37	45	39	35
<i>Lowville.....</i>	22	19	21	17	15	14	2	13	31	32	31	23	9	13
<i>Number Four.....</i>	23	31	41	23	37	24	23	36	38	42	34	44	31	31
	-16	18	22	14	11	7	-3	11	30	29	26	20	7	6
<i>Atlantic Coast.....</i>	25	42	44	34	35	41	30	29	37	45	44	43	37	32
<i>Brooklyn.....</i>	36	53	56	42	43	49	37	37	44	47	59	48	44	37
	18	35	36	18	30	37	23	24	33	39	33	40	32	29
<i>Manhattan Beach...</i>	32	40	42	54	40	46	48	32	36	40	56	54	42	40
	18	18	36	30	30	36	22	24	26	34	34	36	32	28
<i>New York City....</i>	36	54	55	37	44	48	31	33	42	58	56	56	48	39
	16	36	36	29	31	30	22	23	31	39	34	40	30	26
<i>Willet's Point.....</i>	40	57	61	27	47	49	40	34	45	53	59	49	40	39
	18	33	29	13	30	23	22	26	30	32	36	31	27	27
<i>Brentwood.....</i>	37	57	47	40	51	51	40	41	43	56	54	51	43	41
	14	36	40	25	15	36	20	17	32	38	30	31	28	20
<i>Setauket.....</i>	26	52	51	47	49	49	36	36	46	53	56	51	43	37
	17	31	36	30	26	36	21	26	33	39	34	39	31	28
<i>Bedford.....</i>	32	50	52	51	41	49	38	39	42	58	57	47	43	36
	10	31	35	27	21	31	19	17	30	36	29	35	27	23
<i>Primrose.....</i>	33	50	54	40	44	48	34	36	44	59	58	49	49	38
	13	31	35	29	22	38	21	19	31	39	24	34	26	25
<i>Hudson Valley....</i>	17	35	39	33	30	35	24	26	36	40	41	40	32	29
<i>Albany.....</i>	32	40	47	34	40	47	30	38	43	48	53	46	38	37
	4	26	25	26	25	19	15	17	32	35	30	31	23	20
<i>Lebanon Springs...</i>	21	42	45	45	35	39	35	38	46	33	47	44	40	31
	-9	17	31	20	14	27	8	10	30	21	26	25	19	15
<i>Honeymead Brook..</i>	32	46	45	33	37	40	30	36	43	53	50	45	35	33
	4	31	32	23	18	25	13	15	30	31	24	31	23	21
<i>Poughkeepsie.....</i>	33	45	48	41	35	44	33	38	44	57	57	45	40	36
	5	32	32	24	21	25	15	14	13	32	25	31	24	23
<i>Wappinger's Falls</i>	32	48	49	49	47	47	34	37	45	55	56	45	47	42
	8	32	32	26	22	24	8	16	32	36	35	32	35	28
<i>Catskill.....</i>	25	42	44	39	37	42	32	34	42	49	51	43	40	36
	4	25	29	27	22	27	15	16	31	37	28	31	24	22
<i>West Point.....</i>	36	39	46	52	38	48	42	35	36	42	56	60	47	37
	11	15	32	28	24	28	17	17	33	32	30	36	28	24
<i>Carmel.....</i>	34	50	46	35	39	47	36	39	43	53	55	46	35	36
	7	34	36	28	26	26	16	17	30	33	30	35	21	17
<i>Mohawk Valley...</i>	16	31	33	25	30	26	19	26	34	35	34	34	23	24
<i>Little Falls (1a)...</i>	32	36	42	26	44	32	25	33	37	45	40	46	23	33
	8	25	18	15	20	8	12	16	30	28	27	14	14	16
<i>Canajoharie.....</i>	26	39	50	33	41	47	27	36	37	41	41	49	40	36
	0	25	25	23	18	21	13	16	32	34	27	29	18	17
<i>St. Johnsville.....</i>	25	35	45	38	41	42	27	33	36	39	42	45	35	32
	-3	25	27	20	14	18	10	14	31	31	25	28	17	16
<i>Rome.....</i>	33	38	42	32	40	32	27	36	38	36	40	46	23	28
	5	25	18	12	24	6	10	23	30	24	26	15	15	16
<i>Champlain Valley.</i>	5	24	30	28	24	32	19	19	31	37	38	34	27	21
<i>Plattsburgh Bar'a'ks</i>	12	32	33	41	29	48	39	20	34	37	47	42	43	21
	-12	-10	19	19	16	21	6	8	11	31	31	26	10	10
<i>Glens Falls.....</i>	24	38	40	31	35	40	26	35	39	44	44	40	34	30
	-4	23	22	21	14	15	9	8	31	32	28	27	19	15
<i>Lake George.....</i>	22	37	43	37	35	51	27	35	38	49	50	43	34	33
	-10	23	22	21	15	16	8	6	31	31	26	26	19	14

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
20	10	15	27	39	38	37	39	39	36	31	30	29	28	31	35	34	28.3
25	17	37	52	48	46	37	49	49	39	39	40	36	42	47	51	44	27.8
0	—5	7	17	34	35	32	30	29	27	24	25	21	16	20	19	18	27.8
28	21	32	36	50	40	43	50	50	40	35	35	36	42	45	53	50	29.8
20	8	0	15	33	35	34	31	31	32	28	27	26	25	26	29	30	29.8
27	17	35	39	49	39	40	49	49	40	38	38	41	39	44	49	47	28.2
5	5	6	28	34	34	26	30	34	29	26	24	20	21	22	22	19	28.2
31	22	15	32	43	49	43	37	54	53	36	30	31	33	37	43	47	.....
14	2	—14	—12	13	33	36	25	27	28	26	24	23	5	8	15	18	.....
28	20	34	44	48	43	42	53	49	43	36	33	36	37	44	50	43	29.4
17	—3	—1	18	34	34	35	30	27	34	27	26	25	22	23	23	27	29.4
24	17	31	43	47	44	40	51	43	39	33	31	33	37	43	49	50	26.5
15	1	—7	16	35	26	34	29	28	33	25	25	24	12	13	18	21	26.5
34	28	29	36	42	42	47	46	50	44	39	37	35	38	42	47	44	38.6
45	37	45	41	44	46	57	55	60	50	43	47	46	50	52	55	56	39.7
29	24	19	36	38	39	38	28	41	38	34	31	28	32	32	40	37	37.5
40	40	32	42	40	44	44	62	52	60	48	40	44	44	46	48	48	37.5
30	24	18	22	36	38	38	36	40	38	36	30	28	30	30	54	38	39.0
40	31	45	40	50	44	62	54	61	48	39	41	41	43	54	62	54	39.0
29	22	17	35	39	38	36	42	40	36	33	30	28	31	32	41	38	39.0
41	33	43	42	45	44	61	57	64	51	45	44	45	47	58	64	58	38.9
24	18	20	35	36	36	33	38	38	35	31	27	30	28	33	33	35	38.9
44	35	42	43	47	48	59	59	66	57	44	45	45	51	58	67	58	38.5
25	21	15	29	39	39	32	25	40	38	34	29	17	27	27	28	22	38.5
38	32	39	43	46	42	59	59	58	45	43	44	44	45	52	57	53	39.1
30	23	18	32	38	37	36	34	42	37	35	32	31	32	32	33	35	39.1
38	32	40	40	48	44	61	59	68	47	41	44	45	49	57	62	56	37.6
26	20	12	29	35	39	34	29	35	38	33	28	24	28	25	30	29	37.6
41	32	44	40	48	47	63	60	59	51	45	44	43	48	56	62	55	38.4
29	23	14	30	38	41	37	30	42	39	35	31	24	30	25	29	26	38.4
28	22	24	33	44	40	44	44	48	43	37	36	34	37	38	44	42	35.2
33	25	37	43	56	44	49	58	58	43	40	41	42	46	52	58	52	35.0
24	15	12	22	37	38	35	32	37	35	32	33	31	33	32	31	34	35.0
22	31	45	51	55	44	47	54	54	48	37	47	42	42	46	54	46	32.0
9	—2	17	35	35	34	33	26	33	33	30	28	26	27	19	22	24	32.0
35	24	34	41	52	44	54	61	57	42	42	42	41	43	50	56	50	34.0
23	16	9	24	33	37	35	28	38	35	32	28	21	28	22	26	27	34.0
39	32	40	39	53	45	60	60	61	45	43	45	46	49	55	61	54	35.2
17	18	9	21	36	24	32	27	36	34	33	31	22	27	21	26	26	35.2
38	32	41	41	55	46	57	61	59	55	42	45	42	49	55	60	55	37.6
25	18	10	26	35	40	37	31	42	38	32	30	24	29	25	25	32	37.6
37	28	33	37	50	43	52	55	52	44	39	42	42	47	53	60	54	35.0
26	17	10	24	35	38	36	35	38	36	34	33	31	31	29	43	33	35.0
38	39	32	42	58	47	46	57	58	61	48	42	42	44	47	57	63	36.7
25	21	12	20	34	36	31	36	40	39	34	30	26	31	27	32	34	36.7
34	27	37	42	58	47	56	57	63	56	40	39	40	42	51	57	52	36.4
22	18	11	26	38	37	38	29	44	39	34	28	24	29	20	30	32	36.4
22	14	19	31	39	39	34	40	42	35	31	32	32	33	36	38	36	30.4
21	15	30	36	48	39	40	48	50	38	30	33	35	38	45	51	36	28.4
11	2	5	24	34	35	3	31	30	29	25	25	21	24	26	29	24	33.0
30	27	33	39	44	44	45	50	53	43	42	38	41	41	46	52	50	33.0
24	12	7	22	39	39	37	30	35	33	29	30	29	28	29	30	30	31.0
32	26	31	38	48	42	42	50	50	40	34	34	38	42	46	52	51	31.0
22	8	1	19	33	37	34	28	34	33	28	30	27	25	26	27	27	29.4
30	22	30	40	40	41	41	51	50	38	35	37	40	43	46	31	48	29.4
7	2	16	28	26	34	30	30	34	30	27	27	23	24	25	28	25	29.4
25	16	12	24	36	39	40	40	39	37	36	35	35	38	38	40	38	30.1
32	24	16	25	40	42	40	44	41	45	38	37	37	37	44	47	52	27.8
12	7	10	9	10	33	35	35	31	32	30	28	28	29	29	27	30	30.7
33	24	28	45	50	45	45	52	50	40	40	40	40	49	51	56	45	30.7
22	8	0	13	34	36	35	30	30	30	32	30	29	30	24	25	25	31.8
36	26	28	44	47	43	51	51	53	43	45	45	45	51	53	62	52	31.8
19	7	—7	8	34	34	33	28	29	33	31	30	29	30	25	24	26	31.8

TEMPERATURE—MARCH, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	5	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Val.</i> ..	13	27	24	24	30	19	15	23	33	36	35	37	22	23
<i>Madison Barracks.</i> ..	24	43	40	39	35	20	33	43	45	40	38	50	27	24
Watertown	15	16	25	17	23	13	4	21	29	35	30	25	8	12
Canton	36	38	38	37	45	25	32	40	40	45	48	51	42	36
North Hammond ..	24	26	6	17	26	14	6	14	26	25	28	22	14	8
Ogdensburg	35	34	32	26	42	23	21	29	42	42	47	49	31	37
Potsdam	-13	18	19	14	15	7	2	10	36	28	28	25	4	12
Great Lakes	36	32	28	26	38	34	26	30	38	42	38	48	40	36
Westfield	-6	20	20	16	20	12	4	14	30	32	30	36	32	24
Buffalo	28	37	27	28	47	25	25	28	34	40	35	47	35	34
Pittsford	-8	14	13	15	15	5	3	11	24	30	29	28	1	9
Rochester	30	33	30	31	40	42	19	24	33	41	47	42	30	35
Appleton	-10	17	14	17	17	8	2	9	22	30	25	23	4	10
Fort Niagara	19	31	35	28	37	30	21	35	42	42	37	40	24	30
Baldwinsville.....	42	42	52	28	52	29	36	54	53	59	42	60	45	39
Ridgeway	5	25	26	22	24	21	15	24	42	33	34	20	19	19
Oswego	40	35	47	34	49	36	22	50	53	50	39	49	28	38
Palermo	4	25	24	21	29	18	16	28	42	32	32	23	17	24
Lyons	38	39	48	33	52	48	29	46	50	48	45	57	35	39
Erie, Pa.	2	24	26	22	26	17	14	23	35	35	33	26	15	20
Central Lakes.....	39	39	48	33	52	43	29	46	50	48	45	57	25	38
Fleming	3	24	25	22	29	19	16	23	36	35	33	22	15	22
Romulus	36	38	37	32	48	48	26	46	46	47	40	53	30	39
Ithaca	-7	24	25	24	22	20	17	21	36	34	29	30	17	21
Mean	36	40	33	35	50	50	27	45	47	49	42	52	35	39
	3	23	23	22	25	18	17	23	34	35	32	32	17	20
Baldwinsville.....	36	37	48	40	44	43	30	43	42	47	44	55	35	39
Ridgeway	2	26	27	24	23	14	10	21	36	33	31	30	18	21
Oswego	36	36	46	32	50	49	25	46	46	49	43	55	30	46
Palermo	-1	23	24	23	25	19	16	21	36	34	32	29	17	20
Lyons	36	35	47	30	48	45	25	42	40	45	38	53	26	40
Erie, Pa.	0	24	28	22	23	13	12	21	34	35	31	26	14	18
Central Lakes.....	30	34	40	37	39	39	25	37	37	43	36	52	31	36
Fleming	-9	25	29	23	19	13	6	14	33	33	28	26	14	16
Romulus	37	38	46	30	48	48	26	44	41	47	45	55	29	38
Ithaca	0	26	25	24	27	17	12	24	35	36	33	29	18	22
Mean	42	42	51	36	56	38	36	55	55	57	47	56	33	41
	7	25	26	22	36	17	16	34	46	34	35	25	22	28
Central Lakes.....	18	31	38	28	33	30	23	33	38	40	39	43	26	30
Fleming	32	36	48	36	42	45	45	43	43	48	46	55	34	38
Romulus	6	25	26	22	20	9	9	23	33	33	32	31	17	19
Ithaca	33	38	52	33	43	48	32	45	46	46	49	55	35	39
Mean	4	25	26	24	26	15	9	22	33	34	31	32	19	21
	32	38	53	31	43	47	31	40	42	46	48	52	33	38
	3	25	26	25	25	17	11	24	32	33	30	32	19	22
Mean	15	31	35	27	31	30	21	28	36	39	38	38	26	27

‡ Max. and Min. by the Draper Thermograph. || Received too late to be used in computing Conduit, nine miles north of city.

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
20	12	21	32	40	39	40	38	39	36	33	31	33	32	36	38	37	29.7
22	26	36	46	46	55	43	46	48	49	36	34	29	42	38	43	39	29.8
15	4	7	19	32	33	34	29	27	32	27	24	25	24	27	29	27	
38	22	32	43	44	58	54	50	43	50	33	36	42	38	50	59	....	32.2
10	7	28	35	36	28	28	30	35	28	28	25	24	22	32	27	....
27	13	33	43	46	47	49	45	47	37	39	40	39	40	46	51	46	
11	-3	11	12	31	34	38	31	29	31	29	22	27	24	24	26	26	28.8
30	20	34	48	54	40	40	48	54	40	40	40	42	40	40	46	54	
12	6	6	26	36	36	36	32	32	32	30	26	30	26	28	28	28	31.2
27	20	31	40	45	44	45	42	48	40	37	37	36	41	46	49	46	
8	0	5	18	34	34	34	32	32	31	27	26	29	22	28	28	32	28.3
26	29	33	37	42	44	42	40	45	36	36	36	36	39	43	48	44	
10	5	0	16	30	32	33	33	31	30	29	23	27	24	25	28	24	27.7
26	20	27	41	45	50	42	42	39	38	32	30	33	33	36	41	38	31.3
29	26	47	54	60	60	60	61	45	42	31	32	36	35	44	53	....
22	12	12	39	41	44	35	34	30	30	26	27	25	28	26	35	....	35.8
26	25	44	48	54	55	42	53	47	37	30	32	36	37	48	57	47	
21	17	16	38	40	36	54	36	35	28	28	26	24	27	27	37	34	
31	22	43	52	53	57	49	53	48	47	34	35	32	40	46	49	46	
21	17	15	34	41	44	35	31	32	32	28	26	28	25	27	38	35	
30	22	44	50	52	63	49	50	47	44	36	33	38	40	46	51	46	
21	16	16	38	42	45	27	35	33	31	28	27	26	27	27	36	35	35.0
31	26	34	50	46	60	45	45	40	42	35	35	40	37	40	44	45	
22	18	14	30	37	37	37	31	29	32	30	28	28	28	25	31	31	
32	26	34	42	46	62	49	45	41	44	34	35	38	39	41	49	48	
21	18	10	31	36	36	38	33	31	33	29	27	28	29	25	33	30	33.9
31	24	36	46	53	59	48	56	52	43	36	38	40	41	49	54	46	
23	11	7	27	37	37	33	31	32	34	29	28	28	27	28	28	29	
32	25	40	50	50	61	48	41	42	44	34	34	39	37	46	50	46	
21	17	16	33	38	39	40	32	31	33	29	27	26	26	27	32	31	
24	22	36	46	50	56	44	54	46	42	33	33	37	36	38	46	40	
22	13	10	31	38	41	36	32	34	33	29	30	28	30	28	30	33	33.0
28	25	34	43	50	49	44	57	49	41	35	31	36	37	44	51	44	
18	10	5	27	36	41	36	28	29	35	27	28	28	27	25	24	28	
31	24	42	50	55	62	45	56	50	46	35	35	40	39	47	53	43	
23	17	18	34	43	43	35	32	33	39	30	29	29	29	29	32	32	
28	25	48	54	55	60	50	51	38	42	31	32	36	38	42	46	41	
23	18	20	40	39	41	39	34	33	31	28	26	26	29	28	24	32	36.0
27	20	27	41	48	52	45	49	42	39	32	32	32	33	36	43	38	35.0
33	25	42	47	51	58	51	62	50	45	37	35	36	38	48	52	45	
20	13	10	35	41	44	39	31	32	35	27	26	26	25	25	31	30	34.5
34	27	44	51	59	63	51	66	53	43	39	39	39	41	50	59	51	
21	14	12	35	41	43	39	33	31	33	29	28	27	27	26	31	28	
32	25	42	44	57	57	51	68	52	45	35	37	37	28	47	54	46	
24	15	10	36	40	44	37	32	33	33	27	27	27	27	23	31	27	34.8
25	18	23	34	43	44	42	43	42	38	33	32	32	33	36	42	38	32.9

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1) City Reservoir; (2a) Intake

DAILY AND MONTHLY PRECIP

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i> ...	0.10	0.22	0.28	0.01	0.20	0.01	0.01	0.01	0.25	0.17	T.	0.04	0.02	0.13
Alfred.....	.05	.25	.50	.....	.30	.....	.....	T.	.26	.14	.....	T.	.....	.05
Angelica.....	.15	.20	.40	.....	.45	T.	.....	T.	.54	.25	.....	T.	.....	.20
Bolivar.....	.18	.20	.34	.06	.30	.19	.....	T.	.27	.35	.....	.02	.....	.18
Friendship.....	.15	.25	.38	T.	.30	.....	.....	T.	.15	T.	.....	.06	T.	.20
Franklinville.....	.14	.34	.18	.01	.25	.02	.....	.....	.10	.35	.....	.11	.01	.25
Humphrey.....	.27	.20	.40	.....	.16	.....	.....	.....	.10	.15	.....	.02	T.	.18
Little Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherry Creek.....	.17	.27	.60	.09	.31	T.	.....	.....	.32	.24	.....	.10	.06	.30
Jamestown.....	.20	1.10	.56	T.	.38	.....	.....	T.	.20	.24	.....	.10	.20	.20
Elmira.....	.....	.....	.....	.....	.22	.....	.....	.....	.15	.....	.....	.....	.....	.....
Pine City.....	.08	.20	T.	.03	.09	.06	.....	.....	.08	.15	.....	.....	.10	T.
Akron.....	.27	.08	.....	.....	.31	T.	.....	T.	.35	.19	T.	.16	T.	.41
Avon.....	.....	.10	.13	.....	.04	.....	.....	.25	.27	.....	.....	T.	T.	.07
Mt. Morris.....	T.	.10	.90	.....	.....	.....	.....	.....	.40	.20	.....	T.	.....	T.
Lockport.....	T.	.....	.35	.....	T.	.....	.....	.....	.41	.33	.....	.10	T.	.30
Victor.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tyrone.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wedgewood.....	.10	.20	T.	T.	.13	T.	.....	.....	.15	.13	.....	.02	.....	T.
Addison.....	.03	.12	.01	.....	.17	.02	.....	.....	.24	.12	.....	T.	.....	.08
Atlanta.....	.05	.12	.13	.....	.09	.....	.....	.....	.19	.13	.....	.....	.....	.05
Haskinville.....	.....	.18	.10	.....	.10	.....	.20	.....	T.	.13	.....	.....	T.	.....
South Canisteo.....	.15	.30	T.	.....	.30	T.	.....	T.	.35	.10	.....	.05	.....	T.
Arcade.....	.10	.09	.61	T.	.12	.....	.....	T.	.30	.10	.....	.02	T.	.10
Attica.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Eastern Plateau</i> ...	0.06	0.17	0.17	0.01	0.31	0.04	0.00	0.00	0.11	0.15	0.01	0.04	T.	0.12
Binghamton (1).....	.10	.20	.18	T.	.20	T.	.....	.....	.09	.18	T.	.....	.....	.10
Binghamton (2).....	.15	.16	.08	T.	.28	T.	.....	.....	.08	.17	.....	T.	T.	.10
Oxford.....	.10	.30	.29	T.	.47	.03	.....	.....	.10	.28	.....	.02	T.	.20
Cortland.....	.....	.....	.20	.07	.10	.....	.....	.....	.15	.09	.....	.05	.....	.10
South Kortright.....	.....	.04	.53	.....	.42	.....	.....	.....	.....	.25	.....	.....	.....	.....
Brookfield.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middletown.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Jervis.....	.09	.19	.....	.....	.31	.03	.....	.....	.....	.15	.....	.14	.....	.48
Warwick.....	T.	T.	.10	.....	.17	.....	.....	.....	T.	.08	.....	.03	.....	.19
Cooperstown.....	.15	.10	.60	.....	.35	.....	.....	.....	.20	.03	.....	.....	.....	.10
|| Garrettsville.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Lisbon.....	.06	.18	.24	.14	.16	.....	.....	.....	.06	.24	.....	.09	.....	.04
Oneonta.....	.....	.69	.14	.....	.....	.51	.....	.....	.16	.12	.09	.....	.....	.....
Perry City.....	.04	.16	.10	T.	.10	.....	.....	.....	.32	.15	.....	.05	.....	.05
Newark Valley.....	.02	.25	.02	.....	.40	.....	.....	.....	.10	.22	T.	.....	.....	T.
Straits Corners.....	.10	.20	T.	.....	.29	.....	.....	.....	.15	.13	.....	.....	.....	.04
Waverly.....	.01	.02	.....	.....	.21	.....	.....	.....	.07	.13	.....	.....	T.	.05
Dryden.....	.....	.....	.....	.....	.55	.....	.....	.....	.30	.22	.....	.08	.03	.....
Mohonk Lake.....	.18	*	†.37	.....	.95	.....	.....	.....	.....	.10	.....	.22	.....	.42
<i>Northern Plateau</i> ...	0.47	0.32	0.73	0.01	0.43	0.04	0.00	0.01	0.45	0.22	T.	0.11	0.02	0.42
Saranac Lake.....	.19	.....	.44	.....	.05	.....	.....	.04	.53	.05	T.	.....	.10	.30
Gloversville.....	.53	.38	.58	.....	.73	.15	.....	.....	.30	.25	.....	.04	T.	.37
Little Falls (2a).....	.75	.97	.11	.....	1.00	.....	.....	.....	1.20	.17	.....	T.	.05	.23
North Lake.....	1.00	.....	2.10	.....	.50	.....	.....	.....	.80	.....	.....	.10	.....	.80
Lowville.....	.15	.23	.48	.04	.02	.10	.....	.....	.05	.15	.....	.29	.02	.50
Number Four.....	T.	.....	.80	.05	.04	.....	.....	.....	.....	.61	T.	.22	.....	.38
Kings Station.....	.60	.70	.60	.....	.70	.....	.....	.....	.30	.30	.....	.10	.....	.40
<i>Atlantic Coast</i>	0.08	T.	0.05	0.00	0.53	T.	0.00	T.	0.03	0.08	T.	0.46	0.04	0.49
Brooklyn.....	.06	.....	T.	.....	.60	.....	.....	.....	T.	.15	.....	.68	.....	.74
Manhattan Beach.....	.....	.....	.....	.....	*	†.16	.....	*	*	†.06	.02	T.	.32	.20
New York city.....	.04	.....	T.	.....	.40	.02	.....	T.	.01	.09	.....	.36	.....	.46
Willet's Point.....	.20	T.	.....	.....	.50	.....	.....	.....	.10	.11	.....	.52	.....	.82

TATION FOR MARCH, 1897—(INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.	
0.02 .06 .04 T.	0.02 .01 .12 T.	0.00 T.	T. T. T.	0.12 T. T.	0.39 .44 .64 .31 .32	0.01 .07	0.07 T.	0.27 T. .68 .37 .37	0.44 .98 .32 .35 .35	0.12 .10	0.01 T.	0.02 .03 .12 T.	0.00	0.00	0.00	0.01	2.93 3.24 4.21 3.37 2.59	
.01 .10	T. .05..........	....................	....................	.01 T.	.39 .35 T.	.03...............	.06 .07..........	.23 .06..........	.35 .18..........	.20 T.	T. T.	T. ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	3.04 2.19 4.53	
..... ..... ..... .....	.10 ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	T. T.	.68 .22 .56 .63	....................	.15 .11 .13.....	.33 .42 T. .14	.68 .57 .75 .03	.20......01 .13	T. T.	.10 T.	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	5.52 2.41 2.30 2.89	
..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	T. ..... ..... .....	..... ..... ..... .....	.52 .80 .20 .....	..... ..... ..... .....	T. ..... ..... .....	..... ..... ..... .....	.49 .30 .42	T. ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	1.87 2.70 2.34	
.....	T. .02 .08	....................	....................	.02 .03.....	.48 .31 .35	......02.....	.35 .10 .12	.37 .36 .80	.55 .62 .07	.04 .03	T.	T. ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	2.54 2.29 2.18
..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	.90 .50.....	.05 .05 .42	......01	T. .23 .17	......83 .17	.60 T. .50	.20 .15 .25	..... ..... .....	T. ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	2.46 3.01 2.80
.....	T. .01 .02 .01 .05	T.	0.01 T.	0.11 T. .01	0.55 .95 .78 .97	0.02......07 .07	0.08 .08 .09 .10	0.18 .03 .06 .05	0.54 .64 .53 .77	0.09 .10 .03 .20	0.04 .05 .05 .08	0.01......01	0.00	T.	0.00	0.00 ..... ..... .....	..... ..... ..... .....	2.86 2.92 2.66 4.08
..... ..... ..... .....	.03...............	....................	....................	....................	.09...............	....................	.05...............	.01 .13.....	.27 .24.....	.19...............	.07...............	.04...............	....................	.04 ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	1.55 2.59
.....
..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	.02 .11.....	.66...............	....................	....................	....................	....................	.30...............	.26 ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	2.74 1.96 3.31 2.38
..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	.02 .74.....	.80...............	.07...............	.01...............	.03 .23 .15	.47 .69 .80	.17 .16.....	.12 ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	2.90 3.50 2.66 2.74
..... ..... ..... .....	.03 ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	T. .03.....	.03 .68 .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	T. ..... ..... .....	.06...............	....................	....................	....................	....................	....................	....................
..... ..... ..... .....	.02...............	....................	....................	.02 .07.....	.65 .52 .66	.10 .03.....	.07 .11 .18	1.00 .43 .07	.02 .23 .....	..... T. .18	.01...............	.02 ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	2.82 1.89 3.37 4.00
.....
0.03 .01 .02 .03	T.	0.00	T. T. T.	0.03 .18 T.	0.66 .20 1.15 .90	0.04 .06 .06 T.	0.02 .09 .03 T.	0.09 .09 .01 T.	0.49 .20 .69 .70	0.14 .10 .07 .31	0.04 .04 T. .04	T. .03 T.	0.00	0.00	0.00	0.00 ..... ..... .....	..... ..... ..... .....	4.88 2.70 5.41 6.66
.10 .04	......02	..........	..........	..........	.80 .37.....	...............	...............	...............	.20..........	.40 .33.....	.30 .09.....	.10 ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	7.20 2.97 4.25 4.95
0.05 .40	0.00	0.00	0.02 .05 T.	0.28 * .06 .08 T.	0.40......62 .55	0.01 T.	0.04 .05 T.	0.08	0.54......46 .44	0.05......40	0.00	T. T. T.	0.00	0.00	0.00	0.00 ..... ..... .....	..... ..... ..... .....	3.18 3.63 2.84 2.51 3.70

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan. Coast (Con.).</i>														
Brentwood	.05		.30		.80				T.	.05		1.00		.50
Setauket	.05		.03		.36	T.		T.	T.	.07		.34		.40
Bedford	.10	.01	.12		.42				.02	.06		.28		.38
Primrose	.16	T.	.02		.61			T.	.08	.04		.46		.39
<i>Hudson Valley</i>	0.06	0.07	0.16	T.	0.38	0.08	0.00	0.00	0.02	0.14	0.00	0.14	0.02	0.26
Albany	T.	.05	.22	T.	.23	.01			.01	.07		.06	T.	.04
Lebanon Springs	.06		.14		.60							.14		.41
Honeymead Brook	.12	.05			.54				T.	.03		.11		.27
Poughkeepsie	.14	.10	.09		.75					.10		.10		.41
Wappinger's Falls	.12	.08	T.		.28				.03	.10		.12		.42
Catskill	*	+.25			.15					.19		.15		.20
West Point		.10	.20			.40				.20			.20	
Boyd's Corners														
Carmel	.13		.16		.41				.13			.21		.57
Southeast Reserv'r														
Eagle Mills			.25		.20	.25				.27		.24		.05
Easton		.27	.54		.69					.46		.36		.27
<i>Mohawk Valley</i>	0.10	0.36	0.33	0.04	0.36	0.00	0.00	0.02	0.56	0.14	0.00	0.04	0.08	0.09
Little Falls (1a)	.16	.54	.18		.42				.96					.20
Canajoharie		.11	.42		.24				.12	.20			.21	
St. Johnsville	.07	.14	.22	.02	.25				.26	.34		.01		.08
Rome	.18	.05	.49	.12	.55			.01	.90			.17	.12	.09
<i>Champlain Valley</i>	0.05	0.16	0.50	0.04	0.24	0.00	0.00	0.00	0.08	0.36	0.01	0.10	0.00	0.39
Plattsburg Bar'cks.			.16	.11	T.				T.	.43	.02			
Glens Falls	*	+.63	.45		.46				.07	.46		.20		.46
Lake George	.10	.23	.88	T.	.25				.17	.20		.11		.72
<i>St. Lawrence Valley</i>	0.13	0.07	0.37	0.01	0.45	0.04	0.00	0.02	0.17	0.34	0.10	0.39	T.	0.25
Madison Barracks	.06		.23		*	+.48		.13		.50		.30		.17
Watertown			.54			.10			.19	.77		.36		.16
Canton														
De Kalb Junction	.08		.59						.39		.45	.51		.12
North Hammond	.20	.36	.50	.05	.76	.10			.34	.32	.12	.54		.16
Ogdensburg	*	+.20	.35		1.00				.10	.43		.35	T.	.90
Potsdam	.30				.50							.30		
<i>Great Lakes</i>	0.08	0.18	0.23	0.04	0.07	0.01	T.	0.01	0.48	0.28	0.01	0.06	0.03	0.19
Westfield	T.	T.			T.				.37					.96
Buffalo	.23	.09	.37		.17	T.	T.		.50	.43		.10	T.	.27
Adams Centre														
Pittsford	.06	.14	.16	.12	.06				.67	.13		.09		.21
Rochester	.06	.15	.18	.13	.06	T.			.54	.20		.11	.07	.21
Scottsville														
Appleton	.08	.23	.26		.10	T.			.32	.38		.10	T.	.22
Fort Niagara	.28	.06	.08	.12					.50		.07			.34
Niagara Falls	.08	.30	.15		.06				.69			.11		.34
Baldwinsville	.10	.46			.12			.15	.79				.13	T.
Skaneateles	.02	.28	.20	.12	.11				.18	.55		.03	.06	
Ridgeway	.09	.18	.22	T.	.05				.25	.31		.06		.19
Demster														
Fulton		.10	.35		.01				.50	.07			.30	.06
Oswego	.10	.15	.43	T.	.13	.03			.74	.59		.11	T.	.20
Palermo	.05	.20	.40		.03				.31	.95		.10	T.	.05
Phoenix		.13	.35	.10		.23			.22	.72			.02	
Lyons	T.	.15	.10		.05	.10		.04	.45		.04	T.		
Rose	.05	.19	.22	.05	.16	T.			.72	.24		.09	T.	.01
Erie, Pennsylvania	.04	.30	.35	T.	.10	T.		.06	.48	.20		.04	T.	.14

TATION FOR MARCH — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.....	.....	.....	.10	.70	.....	.....	.20	.....	.80	.....	.....	T.	.....	.....	.....	.....	4.40
.....	.....	.....	T. .12	.65	.....	T. .02	.....	.76	T. .02	.....	.....	T. .02	.....	.....	.....	.....	2.80
.....	.....	.....	.01	.56	.....	.01	.....	.71	.....	.....	.....	T. .02	.....	.....	.....	.....	2.72
.....	.....	.....	.02	.68	.01	.....	T. .02	.36	T. .02	.....	.....	T. .02	.....	.....	.....	.....	2.83
0.04	T. .01	0.00	T. .01	0.03	0.71	0.01	0.01	0.01	0.57	0.06	T. .01	0.01	T. .01	0.00	0.00	0.00	3.02
T. .01	.....	.....	.....	.01	.76	.04	T. .01	.33	T. .01	T. .01	T. .13	.....	.....	.....	.....	.....	1.85
.....	.....	.....	T. .12	.70	.....	.06	.....	.50	.20	.....	.....	.....	.....	.....	.....	.....	2.88
.....	.....	.....	T. .12	.64	.....	.06	.02	.02	.58	.....	.....	.....	.....	.....	.....	.....	2.56
.....	.....	.....	T. *	†.81	.....	T. .02	.....	.50	.....	.....	.....	.....	.....	.....	.....	.....	3.00
.....	T. .01	.....	T. .10	.87	.....	.....	.05	.....	.62	T. .01	.....	T. .01	.....	.....	.....	.....	2.79
.....	.....	.....	.....	.10	.....	.....	.01	.....	1.00	.....	.....	.....	.....	.....	.....	.....	2.05
.35	.....	.....	.....	0.5	.80	.....	.....	.05	.80	.20	T. .01	.....	.....	.....	.....	.....	3.35
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.68
.....	.....	.....	.....	.....	.82	.....	.....	.....	.91	.....	.....	.....	.....	.....	.....	.....	3.34
.....	.....	.....	.....	.....	1.00	.....	.....	.....	.90	.15	.....	.....	.....	.....	.....	.....	3.49
.....	.....	.....	.....	.....	.74	.....	.....	.....	.47	.....	.....	.....	.....	.....	.....	.....	3.41
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.80
0.02	T. .01	0.00	0.00	0.28	0.40	0.17	0.01	0.18	0.42	0.15	0.01	0.00	0.00	0.00	0.00	0.00	3.74
.....	.....	.....	.....	.88	.24	.....	.....	.13	.49	.26	.....	.....	.....	.....	.....	.....	4.46
.....	.....	.....	.....	.....	.50	.53	.....	.40	.35	.....	.....	.....	.....	.....	.....	.....	3.08
.04	.02	.....	.....	.....	.42	.15	.03	.....	.33	.13	.03	.....	.....	.....	.....	.....	2.54
.05	.....	.....	.....	.22	.44	.....	.....	.18	.52	.21	.....	.....	.....	.....	.....	.....	4.90
0.12	0.00	0.00	T. .01	0.56	0.11	0.01	0.02	0.35	0.28	0.03	T. .01	0.00	0.00	0.00	0.00	0.00	3.52
.36	.....	.....	T. .01	T. .01	.15	.02	.07	T. .01	.84	.10	.....	.....	.....	.....	.....	.....	2.26
.....	.....	.....	.....	.85	.10	.....	.....	.64	.....	.....	.....	.....	.....	.....	.....	.....	4.32
.....	.....	.....	T. .01	.82	.08	.....	.....	.41	T. .01	T. .01	T. .01	.....	.....	.....	.....	.....	3.97
.....	T. .01	0.00	0.02	0.13	0.36	0.00	0.02	0.10	0.33	0.19	T. .01	0.00	0.00	0.00	0.00	0.00	3.48
.....	.....	.....	.22	.....	.....	.....	.....	.....	.27	.05	.....	.....	.....	.....	.....	.....	2.41
T. .01	T. .01	.....	.01	.76	.....	.....	.....	.49	.22	.....	.....	.....	.....	.....	.....	.....	3.60
.....
.....	.....	.....	.....	.38	.....	.....	.....	.....	.47	.20	.....	.....	.....	.....	.....	.....	3.19
.....	.....	.....	.10	.55	.....	.07	.....	.....	.30	.20	T. .01	.....	.....	.....	.....	.....	4.82
.....	.....	.....	.....	.40	.....	.08	*	.....	†.37	.....	.....	.....	.....	.....	.....	.....	4.18
.....	.....	.....	.....	.50	.....	.....	.....	.....	.40	.70	.....	.....	.....	.....	.....	.....	2.70
.0.03	0.01	0.00	0.02	0.15	0.66	0.03	0.03	0.19	0.39	0.15	0.08	0.01	0.00	0.00	0.00	0.00	3.38
.....	.01	.....	T. .01	T. .01	.88	.06	.28	.23	T. .01	T. .01	.....	.....	.....	.....	.....	.....	1.84
.....	.....	.....	.....	.....	.....	.....	.....	.12	.30	.01	.....	T. .01	.....	.....	.....	.....	3.54
.....
.....	T. .01	.....	.....	.02	1.05	.....	.03	.04	.30	.24	.....	.....	.....	.....	.....	.....	3.32
T. .01	T. .01	.....	.01	.02	.67	.04	.07	.05	.34	.16	.06	.01	.....	.....	.....	.....	3.14
.....
.....	T. .01	.....	T. .01	.....	.75	.....	.....	.06	.40	.03	.....	.....	.....	.....	.....	.....	2.93
.....	.....	.....	.....	.....	.60	.....	.....	*	†.35	.....	.....	.....	.....	.....	.....	.....	2.50
.....	.....	.....	.....	.....	.65	.....	T. .01	.....	.46	.12	.....	.....	.....	.....	.....	.....	2.96
.09	.....	.....	T. .01	.73	.80	T. .01	.....	.22	.34	1.00	.20	.....	.....	.....	.....	.....	5.13
.02	.....	.....	.03	.04	1.25	.....	.....	.20	.82	.09	.10	.03	.....	.....	.....	.....	4.13
.....	.....	.....	.....	.....	.84	.01	.....	.....	.42	.04	.....	.....	.....	.....	.....	.....	2.66
.....
.....	.....	.....	.....	1.00	.....	.01	.....	.33	.63	.....	.....	.....	.....	.....	.....	.....	3.35
.01	T. .01	.....	T. .01	.88	.02	.....	.....	.02	.49	.07	.20	.02	.....	.....	.....	.....	4.19
.....
.....	.....	.....	.10	01.	.50	.....	.....	.72	.30	.23	.20	.....	.....	.....	.....	.....	4.15
.33	.13	.....	.....	.78	.27	.....	.....	.....	.32	.38	.47	.08	.....	.....	.....	.....	4.53
T. .01	.....	.....	.05	.65	.....	.....	.....	.65	.10	.....	.....	.....	.....	.....	.....	.....	2.27
T. .01	T. .01	.....	.01	T. .01	1.24	.02	T. .01	.13	.74	.08	.05	.01	.....	.....	.....	.....	4.01
.....	T. .01	.....	.11	.03	.27	.02	.14	.28	.22	.02	T. .01	T. .01	.....	.....	.....	.....	2.79

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	T.	0.19	0.14	T.	0.10	0.00	0.00	0.08	0.31	0.22	T.	0.01	0.00	0.02
Fleming .....	.....	.30	.40	.....	.....	.....	.....	.30	.20	T.	T.	.....	.....	..
Sherwood .....	.....	.....	.02	.....	.....	.....	.....	.....	.60	.10	.....	.....	.....	.....
Watkins .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Romulus.....	.....	.30	.14	.....	.19	.....	.....	.....	.13	.66	.....	T.	.....	.....
Ithaca .....	.02	.17	T.	T.	.19	.....	.....	T.	.32	.14	.....	.05	.....	.07
Average.....	0.13	0.17	0.30	0.02	0.31	0.02	T.	0.02	0.25	0.21	0.01	0.14	0.02	0.24

‡ Record for month incomplete. || Received too late to be included in the averages.
lated from values at other stations.

TATION FOR MARCH — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	0.02	0.00	0.00	0.14	0.67	0.00	0.08	0.21	0.72	0.04	0.01	T.	0.00	0.00	0.00	0.00	3.01
.....	.10	.....	.....	.....	.66	.....	.....	.....	.23	T.	.....	.....	.....	.....	.....	.....	2.19
.....	.....	.....	.....	.56	.31	.....	.02	.60	.70	.05	.....	.....	.....	.....	.....	.....	2.99
T.	.....	.....	.....	T.	.96	.....	T.	.10	1.18	.10	.04	T.	.....	.....	.....	.....	3.80
T.	.....	.....	.....	T.	.73	.....	.28	.25	.78	.02	.....	.02	.....	.....	.....	.....	8.04
0.02	0.01	T.	0.01	0.13	0.54	0.04	0.04	0.14	0.48	0.13	0.02	T.	T.	T.	0.00	T.	3.40

* Amount included in next measurement. † Not included in computing averages. § Interpo-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE—(DEGREES FAHR.).									
		Normal for the month of March.	Length of record, years.	Record begins.	Record ends.	Mean for March, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR MARCH.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		30.2				34.5	+4.3				
Angelica.....	Allegany.....	28.5	14	1855	1897	33.0	+4.5	38.0	1894	21.4	1872
Humphrey.....	Cattaraugus.....	28.4	14	1884	1897	34.1	+5.7	37.5	1894	18.0	1885
Elnora.....	Chenango.....	33.7	18	1851	1897	36.5	+2.8	41.7	1894	24.8	1856
<i>Eastern Plateau.</i>		29.8				32.8	+3.0				
Oxford.....	Chenango.....	31.2	30	1828	1897	31.4	+0.2	38.2	1831	19.7	1843
Cortland.....	Cortland.....	30.0	34	1829	1897	33.0	+3.0	38.4	1842	20.5	1856
Cooperstown.....	Otsego.....	27.5	44	1854	1897	30.3	+2.8	37.2	1871	18.3	1885
Waverly.....	Tioga.....	30.6	15	1883	1897	36.4	+5.8	40.4	1894	21.8	1884
<i>Northern Plateau.</i>		29.3				29.4	+0.1				
Lowville.....	Lewis.....	29.3	31	1827	1897	29.4	+0.1	36.9	1871	19.7	1892
<i>Atlantic Coast.</i>		36.0				39.0	+3.0				
New York city.....	New York.....	36.6	27	1871	1897	39.0	+2.4	44.0	1894	28.9	1872
Setauket.....	Suffolk.....	35.5	12	1886	1897	39.1	+3.6	41.8	1894	30.6	1884
<i>Hudson Valley.</i>		33.0				35.2	+2.2				
Albany.....	Albany.....	31.9	24	1874	1897	35.0	+3.1	40.0	1894	23.1	1885
Honeymead Brook.....	Dutchess.....	31.5	17	1881	1897	34.0	+2.5	39.1	1894	24.4	1885
West Point.....	Orange.....	35.7	76	1826	1897	36.7	+1.0				
<i>Champlain Valley.</i>		27.2				27.8	+0.6				
Plattsburg Barracks.....	Clinton.....	27.2	44	1839	1897	27.8	+0.6	35.0	1871	16.7	1885
<i>St. Lawrence Valley.</i>		26.5				29.4	+2.8				
Madison Barracks.....	Jefferson.....	28.5	39	1839	1897	29.8	+1.3	38.3	1894	15.2	1872
Canton.....	St. Lawrence.....	21.9	35	1862	1897	28.8	+6.9	35.0	1871	16.2	1825
North Hammond.....	".....	27.0	19	1867	1897	31.2	+4.2	36.6	1894	16.7	1872
Potsdam.....	".....	28.7	30	1828	1897	27.7	-1.0	35.1	1831	19.1	1896
<i>Great Lakes.</i>		30.4				34.0	+3.7				
Buffalo.....	Erie.....	30.4	27	1871	1897	35.0	+4.6	40.9	1871	19.7	1885
Rochester.....	Monroe.....	30.6	27	1871	1897	35.0	+4.4	40.1	1878	20.0	1885
Fort Niagara.....	Niagara.....	31.8	41	1842	1897	33.9	+2.1	40.3	1878	21.5	1885
Baldwinsville.....	Onondaga.....	29.6	21	1854	1897	34.2	+4.6	36.9	1894	24.1	1896
Oswego.....	Oswego.....	30.1	27	1871	1897	33.0	+2.9	41.9	1878	18.7	1885
Palermo.....	".....	27.7	44	1854	1897	31.2	+3.5	37.2	1894	17.1	1885
Erie, Pennsylvania.....	Erie.....	32.5	24	1874	1897	36.0	+3.5	42.0	1878	25.0	1885
<i>Central Lakes.</i>		30.5				34.8	+4.3				
Ithaca.....	Tompkins.....	30.5	19	1879	1897	34.8	+4.3	40.3	1894	21.4	1885
Average departure.....							+3.0				

AND PRECIPITATION — MARCH.

STATION.	COUNTY.	PRECIPITATION—(INCHES).									
		Average for the month of March.	Length of record, years.	Record begins.	Record ends.	Total for March, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR MARCH.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau.....</i>		2.47	...	...	...	2.94	+0.46	...	...	...	...
Angelica.....	Allegany.....	2.86	11	1872	1897	4.21	+1.35	4.21	96-97	1.38	1872
Humphrey.....	Cattaraugus..	2.50	14	1884	1897	2.19	-0.31	3.50	1884	1.39	1885
Elmira.....	Chemung.....	2.06	17	1852	1897	2.41	+0.35	5.99	1860	0.25	1889
<i>Eastern Plateau.....</i>		2.62	...	...	...	2.71	+0.09	...	...	...	...
Oxford.....	Chenango.....	2.34	27	1829	1897	4.68	+1.74	5.56	1896	0.54	1836
Cortland.....	Cortland.....	2.71	18	1851	1897	1.55	-1.16	4.92	1862	1.36	1895
Cooperstown.....	Otsego.....	2.65	44	1854	1897	3.31	+0.66	5.29	1871	0.55	1885
Port Jervis.....	Orange.....	3.20	14	1860	1897	2.74	-0.46	6.60	1896	1.18	1885
Waverly.....	Tioga.....	2.21	15	1883	1897	1.89	-0.32	4.37	1884	0.33	1885
<i>Northern Plateau.....</i>		2.28	...	...	...	2.97	+0.69	...	...	...	...
Lowville.....	Lewis.....	2.28	33	1827	1897	2.97	+0.69	5.11	1871	0.30	1827
<i>Atlantic Coast.....</i>		4.10	...	...	...	2.66	-1.44	...	...	...	...
New York city.....	New York.....	4.01	27	1871	1897	2.51	-1.50	7.90	1876	1.19	1885
Setauket.....	Suffolk.....	4.18	12	1866	1897	2.80	-1.38	7.32	1888	1.34	1894
<i>Hudson Valley.....</i>		3.27	...	...	...	2.89	-0.39	...	...	...	...
Albany.....	Albany.....	2.71	24	1874	1897	1.85	-0.86	5.62	1888	0.62	1885
Honeymead Brook.....	Dutchess.....	2.78	17	1881	1897	2.56	-0.22	5.34	1896	1.05	1885
Poughkeepsie.....	".....	3.08	22	1830	1897	3.00	-0.08	6.20	1896	0.87	1896
West Point.....	Orange.....	3.68	50	1840	1897	3.35	-0.33	12.02	1896	0.75	1842
Boyd's Corners.....	Putnam.....	4.12	27	1870	1897	3.68	-0.44	8.30	1896	1.29	1885
<i>Champlain Valley...</i>		2.02	...	...	...	2.26	+0.24	...	...	...	...
Plattsburg Barracks..	Clinton.....	2.02	39	1840	1897	2.26	+0.24	5.05	1840	0.28	1850
<i>St. Lawrence Valley..</i>		2.51	...	...	...	3.31	+0.80	...	...	...	...
Madison Barracks.....	Jefferson.....	2.35	37	1840	1897	2.41	+0.06	5.60	1873	0.70	1869
North Hammond.....	St. Lawrence..	3.35	19	1866	1897	4.82	+1.47	5.56	1873	0.98	1893
Potsdam.....	".....	1.84	29	1828	1897	2.70	+0.86	4.40	1890	0.40	1836
<i>Great Lakes.....</i>		2.56	...	...	...	3.38	+0.83	...	...	...	...
Buffalo.....	Erie.....	2.64	27	1871	1897	3.54	+0.90	5.54	1873	1.08	74-83
Rochester.....	Monroe.....	3.01	27	1871	1897	3.14	+0.13	7.02	1873	0.94	1887
Fort Niagara.....	Niagara.....	2.09	39	1842	1897	2.50	+0.41	4.14	1862	0.37	1851
Oswego.....	Oswego.....	2.76	27	1871	1897	4.9	+1.43	5.08	1881	0.48	1885
Palermo.....	".....	2.03	38	1860	1897	4.15	+2.12	6.10	1873	0.68	1885
Erie, Pennsylvania...	Erie.....	2.80	24	1874	1897	2.79	-0.01	5.41	1878	1.09	1874
<i>Central Lakes.....</i>		2.32	...	...	...	3.04	+0.72	...	...	...	...
Ithaca.....	Tompkins.....	2.32	19	1879	1897	3.04	+0.72	4.75	1896	0.49	1885
Average departure..		...	...	...	...	...	+0.22	...	...	...	...

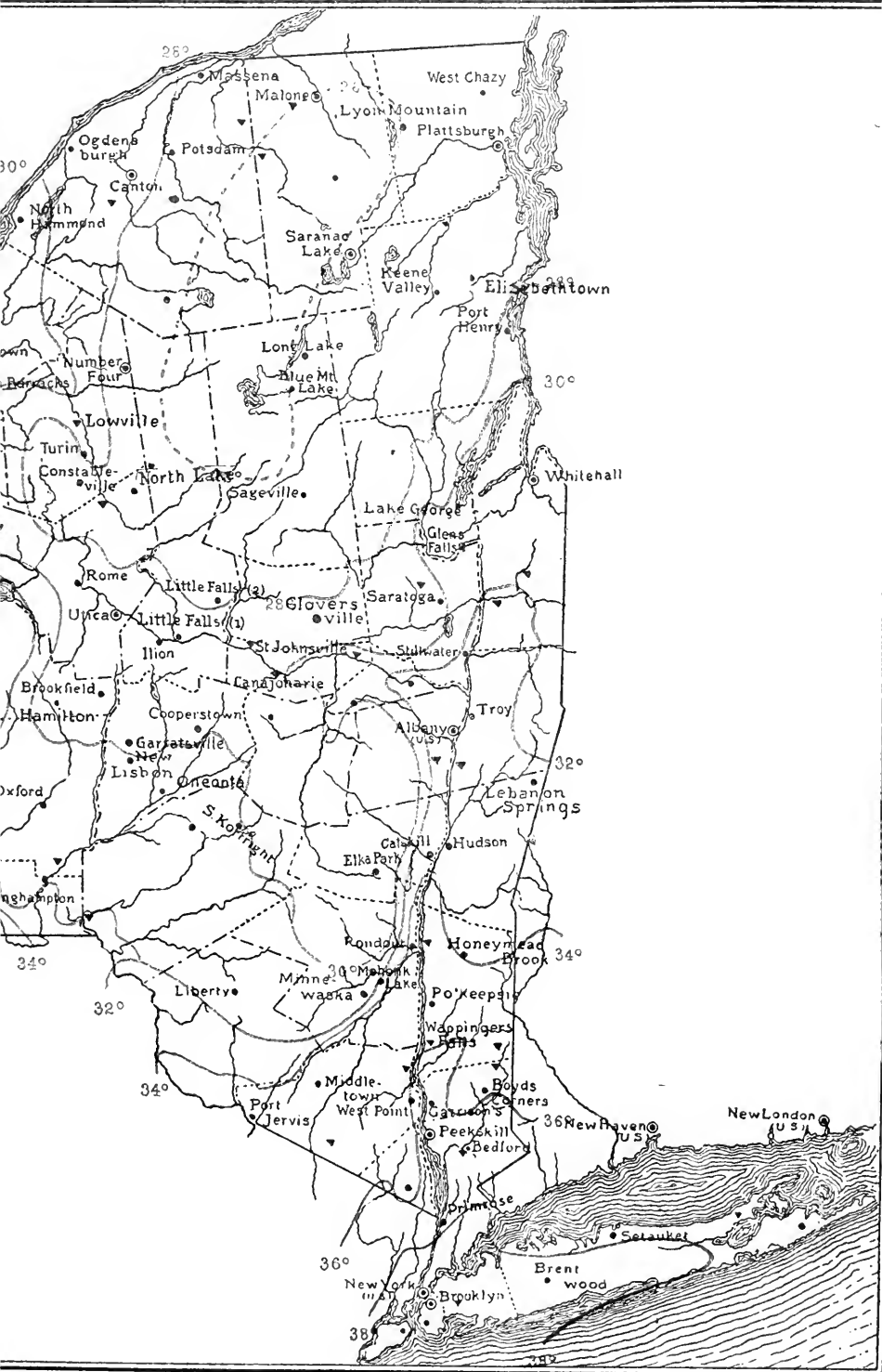
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR MARCH, 1897



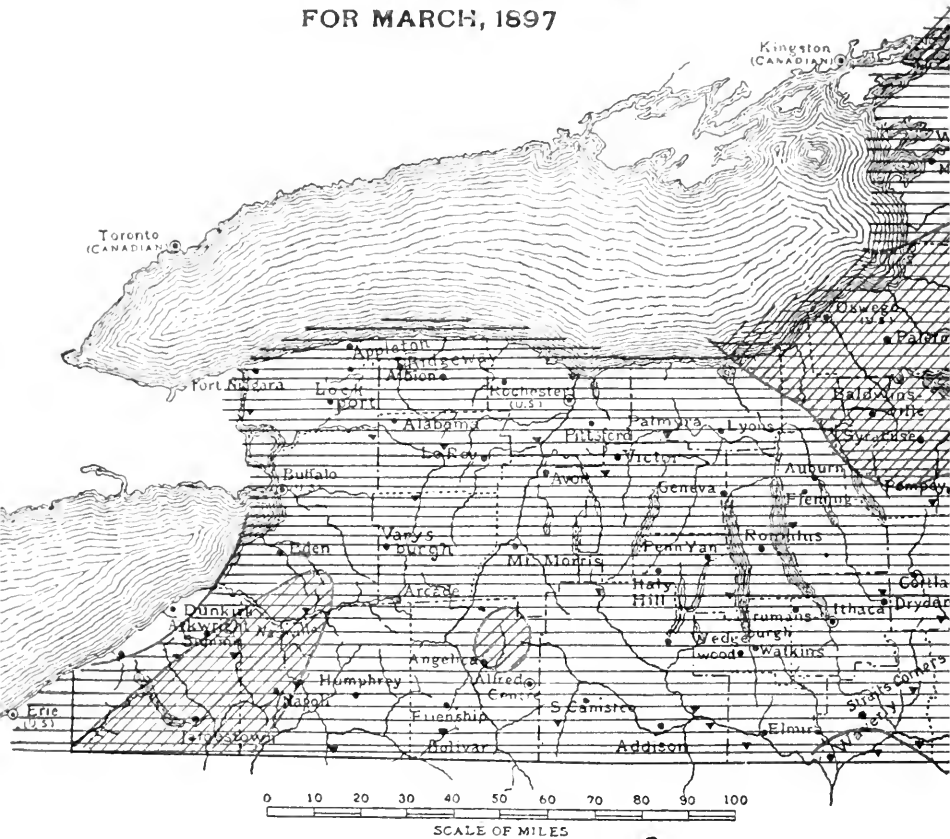


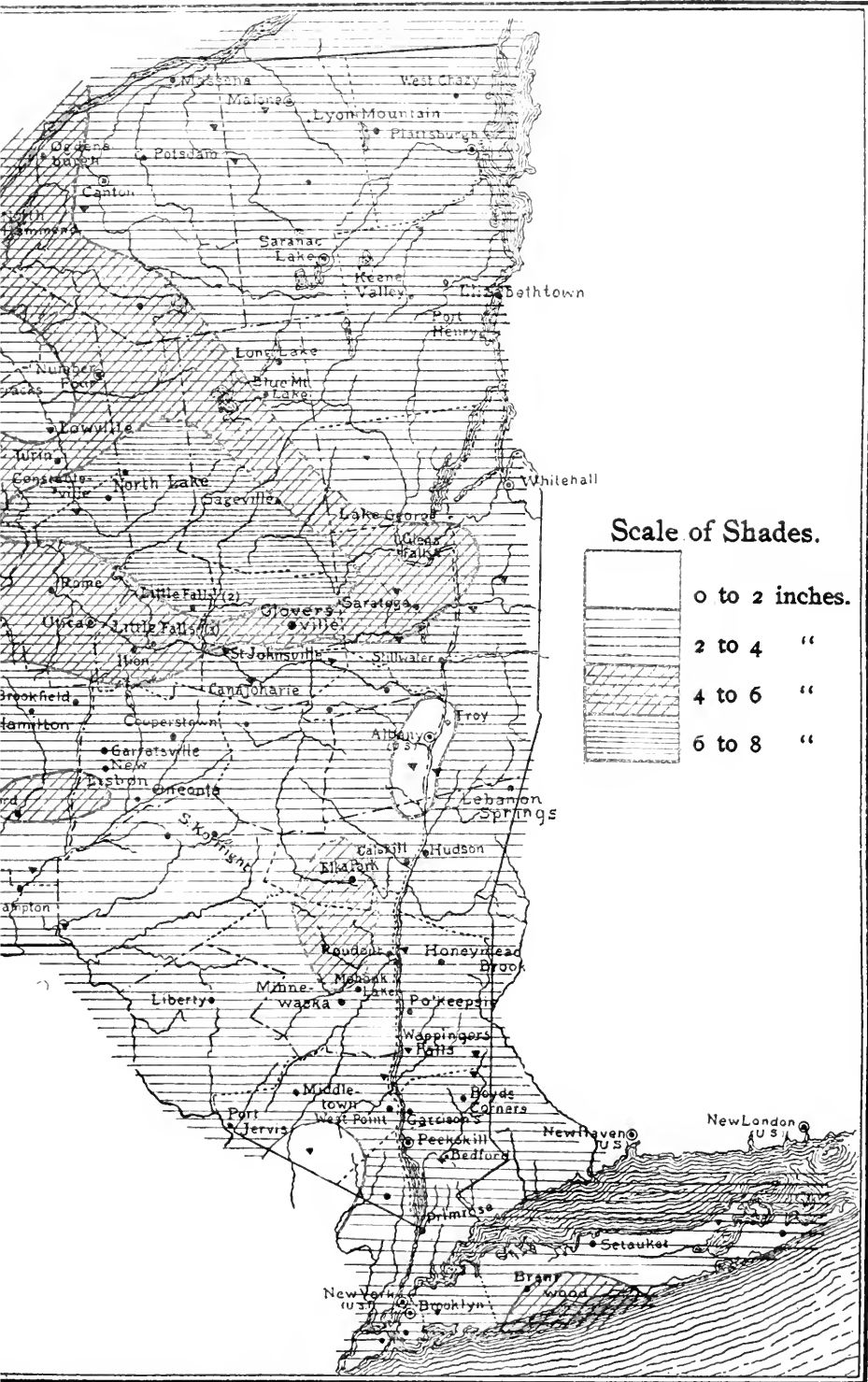
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR MARCH, 1897





Meterological Summary for April, 1897.

The average atmospheric pressure (reduced to sea-level and 32 deg. Fahr.) for the State of New York during April was 30.09 inches. The highest barometer was 30.71 inches at Buffalo on the 20th, and the lowest, 29.52 inches, at Ithaca on the 9th. The lowest mean pressure obtained in the vicinity of Lake Ontario. The average pressure at the six stations of the National Bureau was 0.08 inches above the normal, excesses occurring at all stations.

The mean temperature of the State, as derived from the records of 79 stations, was 45.1 degrees. The highest local mean was 50.8 degrees at Brooklyn, and the lowest, 37.2 degrees, at North Lake. The highest general daily mean was 56.2 degrees on the 24th and 25th, the lowest being 29 degrees on the 20th. The maximum temperature reported was 89 degrees at Garrattsville on the 24th, the minimum being 3 degrees at Little Falls (Station 2a) on the 19th. The mean monthly range of temperature for the State was 62 degrees, the greatest local range being 80 degrees at Garrattsville, and the least, 42 degrees, at Manhattan Beach. The mean daily range was 21 degrees. The greatest local daily range was 52 degrees at Canton on the 22d, and the least, 1 degree, at Westfield on the 19th. The mean temperatures of the various regions were as follows: The Western Plateau, 44.7 deg.; the Eastern Plateau, 44.7 deg.; the Northern Plateau, 41.4 deg.; the Atlantic Coast, 48.5 deg.; the Hudson Valley, 48.3 deg.; the Mohawk Valley, 44.9 deg.; the Champlain Valley, 44.0 deg.; the St. Lawrence Valley, 43.3 deg.; the Great Lakes, 45.1 deg.; the Central Lakes, 46.3 deg. The average of the mean temperatures at 26 stations possessing records for previous years was 1.3 degrees above the normal excesses occurring at all stations excepting Lowville and Potsdam. In general the departures were greatest at southern and central stations.

The mean relative humidity for the State was 67 per cent. The mean dew point was 35 degrees.

The average precipitation for this State was 2.92 inches of rain and melted snow, as derived from the records of 98 stations. The largest general rainfall, exceeding 4 inches, fell over a portion of the Northern Plateau and the Coast Region, while in portions of the Lake Region, western New York and other scattered localities, less than 2 inches fell. The maximum local amount was 4.97 inches at Eagle Mills, and the least, 0.68 inches at Cortland. The average total snowfall at 52 widely distributed stations was 2.4 inches. The heaviest snowfall occurred in the Northern Plateau, with a maximum of 14.5 inches at Elizabethtown. The greatest amount for southern stations was 7.5 inches at Humphery. Many stations of the central and southern sections reported only a trace of snow. The average total precipitation at 26 stations possessing records for previous years was 0.09 inches below the normal amount. Deficiencies were most common in eastern New York.

The average number of days on which the precipitation amounted to 0.01 inches or more, was 10.3. The storm frequency was greatest in the western and northern sections, and at least along the eastern border. The average number of clear days was 10.3; of partly cloudy days, 9.0; and of cloudy days, 10.7; giving an average cloudiness of 52 per cent for the State. The cloudiness was least in eastern and greatest in western New York.

The prevailing winds were from the west. The average total wind-travel at six stations of the National Bureau was 8471 miles, the values being above the usual average for this month at nearly all stations. The maximum velocity reported from the above stations was 58 miles per hour at New York City on the 27th.

ELECTRICAL STORMS.

Lightning was observed at Manhattan Beach on the 4th. On the 5th thunderstorms were reported from 19 stations of all sections; on the 8th lightning was observed at Manhattan Beach; on the 14th light thunderstorms occurred at coast stations; on the 17th a slight storm occurred near Catskill; on the 22d at Alfred; on the 23d thunderstorms were reported from 10 stations of western and northern New York; on the 24th at Alfred and North Hammond; on the 25th at Alfred, South Canisteo, Bedford and Catskill; on the 27th thunder was heard at Poughkeepsie; and on the 27th lightning was observed at Manhattan Beach.

Hail fell on the 5th, 17th, 19th, 26th and 27th. Sleet fell on the 7th, 9th, 17th and 26th.

Auroras were reported generally on the 1st, and from scattered stations on the 2d, 5th, 10th, 25th and 26th. Solar halos or coronæ were observed on the 2d, 11th, 14th, 21st, 23d and 26th. Lunar halos were observed on the 12th, 13th and 14th.

GENERAL FEATURES OF THE WEATHER.

The first week of April was bright and mild, but with frosty nights. The temperature of the second decade averaged slightly lower, while the prevailing weather was cloudy and wet. The most severe cold wave of the month occurred between the 19th and 21st, and was accompanied by general sleet and snow; ice 2 inches thick forming in exposed and northern localities. Nearly midsummer temperature obtained until the 26th, when a decided fall occurred with minimum readings on the 27th; but the values again rose above the normal at the close of the month. The weather was generally fair during the last ten days, the only general rainfall occurring on the 25th. The month as a whole was mild and pleasant.

Seven areas, each of high and low pressure, influenced our weather conditions this month. The depressions were in general much less energetic than during several months preceding, and their common track also changed from the winter to the northerly or summer course. The first, third and fifth anticyclonic areas were strongly developed, the remainder being of small intensity. The following is a brief account of the pressure systems of the month:

High I, 30.7-30.4 inches, passed from the Upper Lakes to the northwestern coast between the 1st and 4th, giving fair, cool weather.

Low I, 29.6 inches, originating in the southwest, traversed the lakes and St. Lawrence Valley on the 5th and 6th, accompanied by rising temperature and thunderstorms, the heaviest rains falling in the Coast and Central Lake regions. Colder weather accompanied the advance of

High II, 30.2 inches, passed along the northern border reaching the Northeastern States on the 10th and 11th, bringing fair weather and temperature slightly below normal.

Low II, 29.6 inches, moved from the southwest over the Ohio Valley and New York on the 9th and 10th with scattering rains and snow.

High III, 30.2 inches, over the Southern States, united with II, forming a ridge over the Eastern States on the 12th and 13th; continued cool weather, light snow in western section, showers on the coast.

Low III, 29.8 inches, over Canada on the 14th. Rising temperature and light, general rains, excepting on the Eastern Plateau. (High winds on the 13th resulted from the gradient between III along the Coast and Low III in the interior.)

Low IV, 29.8 inches, moving northward along the coast. Scattering showers on the 14th and 15th.

Low V, 29.8 inches, moving from the Great Lakes over New York and New England on the 17th, moderate general rains, temperature about normal.

High IV, 30.3 inches, moving from the Central to the Southern States on the 18th and 19th; fair weather.

Low VI, 29.6 inches, a strong cyclone in the Upper Lake Region passing north of New York on the 19th with decreasing force. Scattering rains, maximum winds of the month along the lakes.

High V, 30.7 inches, over the Central States and coast from the 20th to 23d, bringing a cold wave and severe freeze on the 20th; generally fair on the 20th and 21st.

Low VII, 29.9 to 29.5 inches, moving along the northern border and remaining over Canada from the 23d to 26th. This area with V, which had passed to the Southern States, gave hot southerly winds and summer temperatures from the 22d to 26th, with generally fair weather. The area passed off the northeast coast, giving moderate general rains on the 25th, and was followed by

High VI, 30.2 inches, over the Northeastern States on the 27th, bringing a fall of 20 degrees of daily temperature with severe frosts. This area, with the succeeding

High VII, 30.4 inches, over the lakes, gave fair weather at the close of the month.

FARMING NOTES.

Plowing was under way in the warmer localities during the first days of April when the season was said to be two weeks in advance of the usual stage. The maple sugar season was short, being generally over by the 10th, but the product was particularly fine. The cool, wet weather from the 10th to the 21st delayed vegetation and gave fruit trees a timely check. The severe freeze of the 20th caused little damage, excepting to gardens on Long Island. During the warm wave beginning on the 22d plowing and seeding progressed rapidly, and in some warm localities oats, peas and early potatoes were planted. Hop poles had been set by the 20th, tobacco seeding was well advanced and some barley was sown. In the extreme North, however, the season had scarcely commenced.

DEVELOPMENT OF VEGETATION, ETC.

As reported from the following stations: Humphrey, fruit and forest trees were budding on the 18th; Addison, early plums and peaches were in bloom on the 25th; South Canisteo, fruit buds were opening on the 23d, junipers showed blossoms on the 30th; Brentwood, cherry trees bloomed on the 30th. Swallows were first seen at Wedgewood on the 20th and at Appleton on the 23d.

ICE IN LAKES, ETC.

Lake George ice broke up on the 13th, two weeks earlier than in 1896.

High winds were generally reported on the 13th, 26th and 27th.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest. Date.
<i>Western Plateau.</i>													
Alfred	Alleghany	1795									44.7	84.35	
Angelica		1340									43.0	76.25	
Bolivar		1800									43.4	79.24	
Friendship		1550	30.11	30.68	20	29.65	5	1.03			43.6	78.25	
Franklinville	Cattaraugus	1598									44.0	76.25	
Humphrey	"	1950									43.7	77.29	
† Arkwright	Chautauqua	1260									43.6	74.22	
Jamestown	"	1324									43.7	75.2	
Elmira	Chemung	863									43.3	84.25	
Avon	Livingston	585									45.4	80.2	
Mt. Morris		525											
Lockport		650									44.8	78.22	
Victor		Ontario											
Wedgewood	Schuyler	1350									42.9	80.25	
Addison	Steuben	1000							62	34	46.1	81.25	
South Canisteo	"	1480							68	34	43.3	82.25	
Arcade	Wyoming	1707									42.2	76.25	
<i>Eastern Plateau.</i>													
Binghamton (1)	Broome	870									46.0	81.25	
Binghamton (2)		875										82.25	
Oxford	Chenango										44.4	83.25	
Cortland	Cortland	1120									43.2	74.2	
South Kortright	Delaware	1700									42.8	81.25	
Brookfield	Madison	1350											
Middletown	Orange	700											
Port Jervis	"	40									49.5	87.25	
Cooperstown	Otsego	1250									43.1	81.25	
Garrattsville	"										43.2	80.24	
New Lisbon	"	1234									41.6	80.25	
Oneonta	Otsego	1100									44.4	83.25	
Perry City	Schuyler	1085									43.2	82.25	
Straits Corners	Tioga										44.2	81.25	
Waverly	"	824									46.6	82.25	
Dryden	Tompkins	1079									44.2	80.25	
Molok Lake	Ulster	1245									44.8	79.25	
<i>Northern Plateau.</i>													
Elizabethtown	Essex										41.4	86.25	
Saranac Lake	Franklin										41.5	79.25	
Gloversville	Fulton	850									43.5	84.25	
Little Falls (2a)	Herkimer	1526									41.8	80.24	
North Lake											37.3	75.26	
Lowville	Lewis	900									42.6	78.25	
Number Four	"	1571	30.10	30.60	20	29.65	9	0.95			40.4	76.25	
<i>Atlantic Coast.</i>													
Brooklyn	Kings	70									48.5	77.2	
Manhattan Beach											50.8	73.2	
	"										46.0	66.2	

FOR APRIL, 1897.

TEMPERATURE—(IN DEGREES FAHR.).							SKY.		PRECIPITATION—(INCHES).							Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
14	1	61	32	51	22	3	14	9.1	9.4	11.5	11.2	2.53	1.50	<i>h. m.</i>	9	.....	.....
14	20	62	21	39	21	4	7	3	10	17	15	2.69	0.87	.....	9	4.1	S.
16	20	63	22	42	21	4	8	9	8	13	16	3.15	0.70	.....	25	3.0	.....
16	20	62	26	45	21	8	17	5	11	14	11	2.48	0.82	.....	9	2.0	S. W.
18	20	63	25	46	21	8	11	7	7	13	10	2.77	1.01	.....	9	0.5	W.
14	11	62	23	42	21	6	7	10	6	14	17	2.76	0.81	.....	9	5.2	S. W.
15	20	62	21	42	21	4	14	6	9	15	12	1.39	0.50	5.00	25	7.5	S. W.
18	20	56	15	30	19	4	7	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	20	55	20	40	21	7	aa	2	22	6	14	3.77	1.50	.....	9	6.0	S.
23	20	61	23	40	29	3	14	16	1	13	6	2.30	0.90	.....	9	.....	N. W.
19	20	61	24	51	22	10	7	7	11	12	7	1.21	0.58	.....	9	.....	.....
22	20	56	21	37	4	5	13	4	13	5	5	2.10	0.90	.....	9	T.	W.
.....	.....	.....	.....	.....	.....	.....	9	13	12	5	5	1.98	0.55	.....	25	5.0	W.
.....
16	20	64	24	43	21	6	9	6	19	5	13	2.72	1.03	.....	9	4.0	S. W.
20	11	61	25	42	22	8	7	14	7	9	11	2.41	0.88	.....	9	T.	S. W.
15	20	67	27	46	21	10	11	13	5	12	12	3.13	0.88	.....	9	4.0	N. W.
15	11	61	21	33	2	6	9	9	8	13	14	3.06	0.80	5.45	25	6.5	.....
9	20	66	24	49	21	2	ab	11.1	9.3	9.6	9.7	2.72	2.04	.....	15	.....	.....
18	20	63	23	39	29	5	9	10	7	13	9	2.33	0.98	.....	9	0.2	S. E.
18	20	64	22	37	21	4	9	8	12	10	9	1.98	0.80	.....	9	.....	N. W.
16	20	67	22	42	19	10	7	9	10	11	11	3.76	1.27	.....	9	.....	S.
18	20	56	22	38	29	10	ac	17	10	3	4	0.68	0.47	.....	9	.....	W.
12	20	69	26	47	29	10	ab	.....	.....	.....	6	2.91	2.04	.....	15	.....	.....
.....
21	20	66	26	48	20	2	9	14	12	4	12	2.11	1.31	.....	9	.....	N. W.
15	20	66	18	31	19	2	10	11	8	11	11	3.65	1.20	.....	9	T.	S.
9	20	80	22	45	20	7	7	13	9	8	7	3.15	0.73	9.00	7	T.	W.
12	20	67	25	42	29	7	7	7	8	15	10	2.63	1.03	.....	9	T.	S.
16	20	67	26	43	29	9	7	.....	.....	.....	10	3.26	0.97	.....	9	.....	.....
16	20	66	24	40	21	6	15	9	11	10	12	2.56	0.76	.....	9	0.5	N. W.
12	20	69	26	41	2	4	7	12	6	12	14	2.68	0.82	18.00	15	1.5	N.
18	21	64	27	49	21	6	11	10	10	10	12	3.10	0.98	.....	9	0.2	N. W.
18	20	64	24	39	n	8	6	9	15	6	12	2.82	0.69	.....	9	0	W.
14	11	65	21	34	11	7	23	15	3	12	6	2.12	1.15	.....	9	.....	S.
3	19	69	22	49	19	2	9	9.0	8.5	12.6	12.4	3.73	1.40	.....	9	.....	.....
12	20	74	24	41	p	6	15	15	9	6	11	4.75	1.40	.....	9	14.5	S.
9	19	70	21	46	19	4	9	9	8	13	17	3.79	0.78	.....	15	7.2	W.
15	20	69	22	43	29	4	7	9	9	12	10	3.38	1.22	.....	9	T.	N. W.
3	19	77	25	49	19	6	9	4	6	20	14	3.50	0.79	.....	9	2.0	W.
10	20	64	21	42	26	4	28	13	6	11	10	3.80	1.00	.....	14	4.5	N. E.
14	20	64	20	37	22	7	15	6	15	9	13	2.97	0.74	.....	9	4.0	W.
9	20	67	19	34	22	2	9	7	6	17	12	3.93	0.70	.....	17	10.3	W.
17	m	51	21	47	2	4	9	16.0	7.9	6.1	8.9	3.31	2.03	.....	9	.....	.....
26	20	47	19	32	29	4	9	14	5	11	11	2.75	1.31	24.00	9	T.	S.
24	20	42	15	42	20	6	23	21	2	7	12	3.26	0.98	.....	10	.....	N. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.
<i>Adirondack Coast—(Con.)</i>													
New York City.....	New York.....	314	30.10	30.64	21	29.57	9	1.07	69	.....	49.0	74	29
Willels Point.....	Queens.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	49.0	77	29
Brentwood.....	Suffolk.....	80	.....	.....	.....	.....	.....	.....	.....	.....	47.8	47.2	77
Setauket.....	Suffolk.....	40	.....	.....	.....	.....	.....	.....	67	38	47.8	48.7	74
Bedford.....	Westchester..	290	.....	.....	.....	.....	.....	.....	.....	.....	48.2	48.0	77
Primrose.....	"	200	.....	.....	.....	.....	.....	.....	.....	.....	49.2	49.0	77
<i>Hudson Valley.....</i>													
Albany.....	Albany.....	97	30.09	30.63	21	29.64	26	0.99	67	35	48.3	48.0	84
Honeynead Brook.	Duchess.....	450	.....	.....	.....	.....	.....	.....	.....	.....	46.6	46.4	84
Poughkeepsie.....	"	189	.....	.....	.....	.....	.....	.....	.....	.....	48.0	48.0	83
Wappingers Falls..	Duchess.....	110	.....	.....	.....	.....	.....	.....	.....	.....	49.6	49.6	83
Catskill.....	Greene.....	450	.....	.....	.....	.....	.....	.....	.....	.....	48.2	47.8	83
West Point.....	Orange.....	167	.....	.....	.....	.....	.....	.....	.....	.....	49.3	49.3	78
Carmel.....	Putnam.....	500	.....	.....	.....	.....	.....	.....	.....	.....	49.0	49.0	81
<i>Mohawk Valley.....</i>													
Little Falls (1a)....	Herkimer.....	924	.....	.....	.....	.....	.....	.....	.....	.....	44.9	44.1	84
Canajoharie.....	Montgomery..	300	.....	.....	.....	.....	.....	.....	.....	.....	45.2	45.8	84
St. Johnsville.....	"	810	.....	.....	.....	.....	.....	.....	.....	.....	44.1	44.1	80
Rome.....	Oneida.....	445	.....	.....	.....	.....	.....	.....	.....	.....	45.6	45.6	82
<i>Champlain Valley..</i>													
Plattsburgh Bar'ks..	Clinton.....	125	.....	.....	.....	.....	.....	.....	.....	.....	42.2	42.2	84
Glens Falls.....	Warren.....	340	.....	.....	.....	.....	.....	.....	.....	.....	44.0	44.9	86
Lake George.....	"	350	.....	.....	.....	.....	.....	.....	69	34	43.5	43.5	84
<i>St. Lawrence Valley.</i>													
Madison Barracks..	Jefferson.....	266	.....	.....	.....	.....	.....	.....	.....	.....	43.3	43.3	76
Watertown.....	"	486	.....	.....	.....	.....	.....	.....	.....	.....	42.4	42.4	74
Canton.....	St. Lawrence..	304	.....	.....	.....	.....	.....	.....	.....	.....	43.4	43.3	76
North Hammond....	St. Lawrence..	300	.....	.....	.....	.....	.....	.....	.....	.....	43.6	44.0	74
Ogdensburg.....	"	258	.....	.....	.....	.....	.....	.....	.....	.....	41.2	41.2	72
Potsdam.....	"	300	.....	.....	.....	.....	.....	.....	.....	.....	42.0	42.7	76
<i>Great Lakes.....</i>													
Westfield.....	Chautauqua..	758	.....	.....	.....	.....	.....	.....	.....	.....	45.1	45.1	81
Buffalo.....	Erie.....	768	30.08	30.71	20	29.64	5	1.07	67	32	44.0	44.0	74
Pittsford.....	Monroe.....	502	.....	.....	.....	.....	.....	.....	.....	.....	44.6	45.3	80
Rochester.....	Monroe.....	523	30.08	30.68	20	29.65	5	1.03	67	34	46.0	46.0	80
Appleton.....	Niagara.....	301	.....	.....	.....	.....	.....	.....	.....	.....	44.5	44.5	77
Fort Niagara.....	"	263	.....	.....	.....	.....	.....	.....	.....	.....	45.2	45.2	78
Baldwinsville.....	Onondaga.....	390	.....	.....	.....	.....	.....	.....	.....	.....	46.4	46.6	81
Ridgeway.....	Orleans.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45.2	45.2	78
Oswego.....	Oswego.....	335	30.07	30.67	20	29.59	26	1.08	69	34	44.0	44.0	79
Palermo.....	Oswego.....	460	.....	.....	.....	.....	.....	.....	.....	.....	44.2	44.1	81
Lyons.....	Wayne.....	407	.....	.....	.....	.....	.....	.....	.....	.....	46.4	46.0	81
Erie, Pa.....	Erie.....	714	30.09	30.70	20	29.70	5	1.00	.....	.....	45.0	45.0	76

FOR APRIL, 1897—(Continued).

TURE — (IN DEGREES FAHR.).							SKY.			PRECIPITATION — (INCHES).							Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	No. of clear days.	No. of partly cloudy days.	No. of cloudy days.	No. of days on which 0.01 or more in. fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.	
24	20	50	17	36	19	5	9	15	9	6	9	2.96	1.20	.....	9	T.	N. W.
26	k	51	21	40	19	7	9	15	9	6	9	3.21	0.70	.....	9	T.	N. W.
17	m	60	25	47	2	13	5	22	4	4	6	4.90	.....	.....	.....	.....	S. W.
26	20	48	19	31	q	6	9	15	8	7	7	3.29	2.03	.....	9	.....	S.
20	21	57	26	43	29	5	9	14	12	4	11	3.22	1.82	24.00	8-9	.....	S. W.
23	21	54	25	44	2	5	9	11	15	4	6	2.88	1.48	.....	9	.....	.....
19	20	61	22	46	2	3	15	11.2	10.8	8.0	9.6	2.89	1.50	.....	8-9	.....	.....
21	20	62	20	34	19	6	9	7	8	15	13	3.12	1.20	27.30	9	T.	S.
19	20	65	23	40	2	3	15	9	14	7	10	3.33	1.49	.....	9	T.	N. W.
20	21	63	27	46	2	11	27	14	11	5	6	1.30	0.66	.....	15	T.	W.
23	21	60	25	40	r	10	ad	12	13	5	10	3.05	1.58	.....	8-9	T.	N. W.
22	20	61	20	32	19	4	9	6	15	9	8	3.20	1.40	.....	9	.....	N. W.
24	20	54	22	38	20	7	10	.....	.....	.....	13	3.15	0.85	1.00	9	.....	S.
22	20	59	21	35	21	8	9	19	4	7	7	3.05	1.59	27.30	8-9	.....	S. W.
15	19	65	21	64	25	4	17	13.7	6.3	10.0	10.5	2.92	0.81	.....	9-15	.....	.....
15	19	67	20	42	26	8	bb	15	8	7	12	4.47	0.81	.....	9	T.	W.
18	20	66	22	38	29	4	10	17	1	12	5	1.56	0.79	.....	15	0	W.
17	20	63	21	37	29	4	17	9	10	11	12	2.30	0.81	.....	15	0	W.
18	19	61	22	44	25	10	9	.....	.....	.....	13	3.36	0.60	.....	4	.....	.....
14	20	69	21	40	s	2	9	8.5	6.5	15.0	11.0	3.38	1.25	.....	9	.....	.....
14	20	70	19	40	s	6	bc	.....	.....	.....	12	2.67	.....	.....	.....	.....	S. W.
17	20	69	23	39	25	7	bd	8	2	20	8	3.61	1.20	.....	9-10	2.0	S.
17	20	67	22	39	t	2	9	9	11	10	13	3.85	1.25	.....	9	3.0	N. W.
13	20	60	20	52	22	4	be	7.5	8.8	13.7	10.0	2.72	0.66	.....	24	.....	.....
16	20	58	18	35	22	4	a	9	.....	.....	5	1.16	0.32	11.00	9	.....	S. W.
13	20	63	22	52	22	7	cc	10	6	14	12	3.16	0.58	.....	24	3.0	S. W.
14	20	60	19	40	28	4	be	4	15	11	13	2.57	0.66	.....	24	3.8	S. W.
13	20	59	22	50	19	6	15	8	5	17	10	3.98	0.63	17.00	5	1.5	S. W.
13	20	63	20	36	u	5	10	8	9	13	.....	.....	.....	.....	.....	.....	S. W.
19	20	58	19	46	22	1	19	10.1	8.4	11.5	11.8	2.25	1.15	.....	9	.....	.....
22	20	57	19	37	20	1	19	14	3	13	7	2.90	0.85	.....	13	4.0	S. W.
21	19	53	17	32	19	4	6	4	12	14	18	2.56	0.61	.....	14	.....	S. W.
20	20	60	21	38	22	7	7	10	9	11	9	2.23	1.15	.....	9	.....	W.
20	20	60	19	35	19	6	7	10	9	11	15	1.63	0.45	.....	9	5.2	S. W.
22	20	55	18	37	22	5	7	8	6	16	12	2.58	0.83	.....	9	1.0	W.
22	20	56	20	40	22	8	17	.....	.....	.....	8	2.49	0.90	.....	23	.....	W.
21	20	60	21	34	22	6	9	13	7	10	11	2.18	0.48	.....	5	T.	N. W.
21	20	57	18	41	28	7	7	9	17	4	15	2.62	0.60	.....	9-10	4.0	N. W.
19	20	60	16	33	19	4	7	12	4	14	11	2.46	0.77	.....	9	1.0	W.
19	20	62	21	46	22	5	15	12	6	12	9	1.40	0.29	.....	9	T.	S. W.
21	20	60	19	31	19	5	15	9	13	8	14	2.14	0.52	.....	9	2.0	S. W.
23	19	53	16	36	19	5	cd	10	6	14	13	1.55	0.57	.....	9	.....	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point, (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.
													Date.
<i>Central Lakes</i> .....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46.3	82
Fleming.....	Cayuga.....	1000	.....	.....	.....	.....	.....	.....	.....	.....	45.9	45.7	82
Romulus.	Seneca	719	.....	.....	.....	.....	.....	.....	.....	.....	.....	47.0	82
Ithaca.....	Tompkins	810	30.09	30.66	20	29.52	9	1.14	63	35	45.8	46.2	82
Mean.....		.....	30.09	30.71	20	29.52	9	1.04	67	35	.....	45.1	89
													25
													25
													24

* Mean of the tri-daily observations. ‡ Mean of the Maximum and Minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) twenty-four hours. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City Reservoir. (a) 22, 25; (b) 22, 29, 30; (c) 23, 35; (d) 24, 25, 30; (e) 25, 29, 30; (f) 3, 20; (g) 25, 30; (h) 22, 23, 25; (i) 24, 28; (j) 19, 25; (x) 7, 15; (y) 7, 9; (aa) 9, 17; (ab) 9, 10; (ac) 7, 10; (ad) 9, 24; (bb) 8, 15;

FOR APRIL, 1897 — (Continued.)

TEMPERATURE — (IN DEGREES FAHR.).										SKY.		PRECIPITATION — (INCHES).						Prevailing direction of wind.		
Lowest.	Date.		Monthly range.		Mean daily range.		Greatest daily range.		Date.		Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which .01 or more inches fell.	Total.	Greatest rainfall.	+ Duration.		Date.	Total snowfall.
19 20	20 20	63 63	21 20	36 33	21 20	6 8	10 10	7.3 2	13.7 24	9.0 4	8.0 6	2.40 2.21	1.15 1.00	<i>h. m.</i> 14.00	9 6	..... .....	..... .....	9 6	..... .....	..... N. W.
19 20	20 20	63 62	22 20	38 36	28 21	7 6	<i>ce</i> 10	13 7	3 14	14 9	9 9	2.53 2.47	1.15 0.86	..... 17.30	9 9	2.8 0.5	..... .....	9 9	2.8 0.5	S. N. W.
3	19	62	21	52	22	1	19	10.3	9.0	10.7	10.3	2.88	2.04	.....	15	2.4	.....	15	2.4	W.

Thermograph. || Report received too late to be used in computing means. The means from — 4. + Blank indicates that the duration is not shown in the original records, but is within (2a) Intake Conduit, nine miles north of City.
 (i) 11, 20; (j) 20, 21; (k) 19, 20; (m) 4, 21; (n) 22, 30; (p) 21, 22; (q) 20, 30; (r) 2, 22; (s) 20, 26; (t) 2, 10, 11; (bd) 9, 15; (be) 9, 14; (cc) 10, 15; (cd) 7, 10, 17; (ce) 6, 15.

TEMPERATURE—APRIL, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i> ..	36	40	40	44	52	45	39	41	36	33	33	38	49	46
Alfred	49	60	54	52	59	46	38	46	37	31	40	51	58	49
Angelica	21	22	24	30	39	38	34	32	32	27	19	22	37	38
.....	48	59	53	57	64	48	39	46	38	35	43	50	62	49
Bolivar.....	20	18	23	26	41	39	35	33	33	27	19	21	39	39
.....	51	60	58	56	62	48	43	51	40	37	43	52	62	51
.....	18	17	24	28	39	37	34	23	31	27	17	20	36	29
Friendship.....	52	60	59	58	60	48	43	51	40	44	56	63	52	52
.....	21	20	25	28	42	38	35	34	32	28	19	24	41	39
Franklinville	48	60	52	56	62	50	40	46	41	36	45	50	60	50
.....	20	20	25	30	41	39	34	32	32	26	14	21	37	38
Humphrey	51	65	60	53	61	45	42	46	35	36	45	53	60	41
.....	25	26	30	37	40	35	32	31	29	25	19	25	39	37
Arkwright .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jamestown	52	58	58	54	60	46	43	51	39	37	43	52	60	53
.....	26	28	31	42	42	37	34	33	32	29	23	27	42	39
Elmira	55	60	56	62	63	54	49	53	44	43	56	56	57	53
.....	24	29	30	34	30	42	42	34	34	33	30	28	32	50
Avon.....	47	52	52	62	65	56	45	52	42	38	44	52	64	53
.....	20	22	23	23	44	43	35	30	31	20	21	22	35	41
Lockport	48	55	44	69	66	54	45	49	37	46	47	54	66	49
.....	29	36	29	32	44	38	34	34	32	29	25	25	42	40
Wedgewood.....	49	60	51	55	64	50	44	50	38	41	48	51	56	52
.....	24	27	26	28	39	40	33	30	32	27	23	25	35	40
Addison.....	51	62	55	55	66	55	46	45	44	42	52	53	58	56
.....	23	22	27	27	41	42	38	35	33	32	20	26	26	45
South Canisteo	50	60	55	58	65	52	45	53	43	41	47	52	60	54
.....	17	17	21	29	38	41	35	32	33	27	19	20	34	41
Arcade.....	45	55	49	58	61	45	40	47	36	33	42	47	60	47
.....	25	22	29	32	41	36	32	32	30	24	15	22	39	36
<i>Eastern Plateau</i> ...	36	41	39	42	53	47	42	41	39	36	35	29	43	50
Binghamton (1)	50	59	57	55	67	50	48	50	44	44	45	55	56	57
.....	24	25	27	33	40	40	38	37	39	33	28	28	30	45
Binghamton (2)	50	58	54	54	67	51	45	50	42	41	43	55	56	59
.....	26	25	27	34	42	40	38	36	38	31	28	28	34	42
Oxford.....	48	57	56	58	67	57	47	48	45	40	43	52	57	57
.....	20	20	21	25	38	38	37	33	33	29	23	20	28	43
Cortland	42	52	52	56	66	60	45	48	49	39	45	49	53	54
.....	24	22	24	31	41	42	35	33	33	29	27	25	22	24
South Kortright ...	48	54	49	57	66	57	47	49	42	40	44	42	56	50
.....	19	20	27	20	38	38	35	33	33	30	25	20	25	43
Middletown	52	65	51	51	64	54	54	54	42	47	49	54	55	.....
.....	35	36	33	30	37	45	39	40	39	38	35	35	35	.....
Port Jervis.....	58	65	56	58	73	59	54	59	43	49	54	61	62	70
.....	23	30	30	26	39	44	36	42	41	38	32	33	30	47
Cooperstown.....	45	52	44	56	65	47	45	42	39	35	38	47	55	53
.....	24	28	27	26	42	43	36	34	34	33	29	25	30	44
Garrattsville	46	55	48	56	65	49	43	44	41	38	38	50	56	54
.....	24	25	26	29	40	39	36	35	33	30	26	23	32	41
New Lisbon.....	47	56	50	56	66	50	43	45	40	38	42	52	55	57
.....	19	22	21	21	39	37	36	32	32	29	23	18	27	42
Oneonta	55	58	58	60	71	55	49	50	45	43	46	59	60	61
.....	22	26	24	26	40	43	40	36	34	33	27	23	30	47
Perry City	41	56	49	57	67	52	45	48	38	40	44	50	58	51
.....	19	19	21	23	37	38	34	30	31	28	22	20	29	41
Straits Corners.....	50	61	57	54	66	53	40	40	52	40	46	55	57	62
.....	24	20	25	27	40	37	36	35	32	30	24	24	31	44
Waverly	56	65	60	60	70	52	46	52	44	44	52	68	59	58
.....	23	19	19	27	41	40	40	35	38	32	25	25	32	37
Dryden	47	55	51	57	68	49	44	50	42	40	41	51	58	56
.....	20	21	22	30	42	41	35	33	34	29	24	22	34	42
Mohonk Lake.....	46	60	60	49	59	55	48	48	48	46	48	50	51	64
.....	30	31	30	30	35	45	35	20	18	19	14	31	37	42

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
41	43	39	46	38	28	40	59	64	65	63	48	38	49	58	60	44.8
41	51	38	58	52	34	60	74	72	72	76	58	43	64	73	72	43.0
33	32	31	28	18	14	20	44	52	54	48	34	26	34	42	46	43.4
39	46	38	63	48	37	60	75	77	79	73	50	46	64	73	74	43.6
35	30	32	26	20	16	18	43	52	55	50	33	27	32	41	46	43.6
45	53	39	60	57	37	61	76	74	75	78	65	46	65	75	77	45.3
33	22	31	25	20	16	16	41	48	52	46	34	27	28	40	47	44.0
52	43	43	63	58	38	65	78	75	81	77	61	51	68	75	76	43.6
34	32	31	30	19	18	19	42	52	53	49	34	28	31	41	49	45.3
45	52	44	60	56	33	61	76	74	73	76	57	44	65	73	74	44.0
36	32	32	28	22	17	19	44	52	56	50	35	28	32	41	48	43.6
44	49	36	59	50	35	62	76	72	73	74	50	44	57	77	74	43.6
34	35	30	27	19	15	20	46	54	55	48	30	27	32	47	49	43.6
48	50	40	60	52	35	60	75	73	74	74	54	44	71	75	75	45.7
36	36	33	29	23	20	20	49	54	57	51	38	31	34	47	54	48.3
45	55	55	70	63	41	61	72	77	79	84	65	52	64	76	76	45.4
35	33	29	45	27	23	23	45	51	55	56	35	33	36	36	53	45.4
50	60	61	63	61	38	60	79	80	75	80	59	47	61	70	64	46.4
38	38	35	29	28	19	23	28	56	56	51	39	30	33	39	44	44.9
54	61	45	59	49	40	58	78	77	71	68	58	47	67	74	68	46.2
37	38	35	30	24	22	26	50	55	54	42	38	32	36	48	45	44.5
41	55	47	64	4	39	63	74	77	79	80	64	48	61	74	74	43.0
33	32	33	30	21	16	20	43	51	54	48	36	27	32	40	46	44.7
53	59	50	62	55	39	60	73	77	77	81	67	52	66	72	76	45.9
37	31	36	31	28	21	21	31	50	52	47	39	31	38	36	48	46.0
45	55	48	62	55	39	62	77	78	82	82	65	48	65	74	74	44.4
32	28	32	27	22	15	16	40	46	48	50	36	26	31	34	44	43.2
45	55	39	58	48	32	58	74	74	70	76	56	42	62	70	71	42.8
35	34	30	29	19	16	19	46	50	56	45	35	26	33	48	46	44.7
40	45	43	46	39	27	40	53	61	65	64	51	38	46	52	57	45.9
45	57	47	58	56	27	59	70	78	77	81	68	45	62	74	78	46.0
35	31	37	35	26	18	23	37	50	56	50	38	22	35	35	40	44.4
42	56	47	60	57	33	58	69	77	78	82	65	46	62	72	77	43.2
35	31	36	34	21	18	21	42	50	59	51	34	31	36	37	43	42.8
48	58	54	58	62	37	55	68	77	82	83	81	47	61	70	77	49.5
32	25	35	20	16	17	30	44	43	44	42	28	30	30	38	38	3.2
53	52	55	57	31	31	51	68	70	74	74	59	45	59	71	74	44.0
21	38	32	34	18	18	20	42	48	52	48	36	28	30	33	43	44.2
48	58	48	57	58	24	56	68	76	77	81	66	43	53	71	72	44.2
33	29	35	29	15	12	16	26	43	53	40	37	25	32	24	35	45.0
48	68	56	67	65	45	66	73	72	80	84	64	43	51	73	70	49.5
42	32	41	38	40	21	22	30	40	46	58	47	35	41	36	45	3.2
44	54	45	54	52	27	47	66	73	72	81	64	41	47	62	66	44.0
34	33	39	35	21	15	22	36	52	55	52	40	30	39	32	42	44.2
43	58	45	55	46	54	69	72	74	89	64	41	56	68	70	68	44.0
34	30	33	32	20	9	33	34	50	48	37	26	35	32	43	50	2.3
44	56	48	55	57	33	54	67	75	75	80	63	38	57	69	73	6.4
32	29	35	31	21	13	16	28	42	50	40	35	27	35	27	37	3.2
51	60	52	61	54	39	60	72	79	80	83	70	44	59	75	75	44.2
37	32	37	34	23	16	20	33	47	49	45	40	28	37	32	39	46.9
41	57	47	61	49	23	58	73	77	76	82	64	46	61	70	72	44.2
35	30	36	30	23	16	18	39	49	50	50	81	28	32	34	43	44.2
46	61	50	60	50	35	54	70	77	79	81	66	45	58	70	74	44.2
34	30	27	33	22	12	13	31	43	51	47	34	30	30	31	45	46.9
46	60	50	65	52	38	67	72	77	81	82	67	50	66	74	76	44.2
35	27	38	35	25	19	18	43	51	54	46	38	31	34	32	45	44.2
43	57	48	61	55	32	57	73	78	74	82	64	44	59	70	75	45.0
32	21	35	32	21	18	19	34	52	55	48	37	28	30	36	36	45.0
49	57	54	55	58	38	55	62	70	74	79	61	48	46	64	67	45.0
39	37	38	35	29	19	26	40	45	55	58	44	34	39	37	44	45.0

TEMPERATURE—APRIL, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau.</i>	35	38	33	40	48	43	38	37	35	33	33	26	41	43
Elizabethtown ¹	48	56	40	56	68	56	46	44	42	44	42	50	48	56
	24	28	20	18	36	34	34	32	32	32	34	26	26	24
Saranac Lake.....	50	53	45	62	63	44	43	39	35	35	38	48	49	44
	29	18	20	38	39	30	31	31	31	27	18	26	41	36
Gloversville.....	52	56	47	54	64	51	44	44	39	37	46	55	58	56
	29	30	26	24	36	41	40	35	33	31	29	26	27	41
Little Falls (2a)....	45	51	45	52	62	53	47	44	38	45	45	54	52	48
	21	21	20	32	34	35	34	33	32	23	22	24	39	36
	42	47	47	48	51	59	42	40	40	35	30	38	48	49
North Lake.....	15	18	17	20	23	30	32	32	32	28	22	17	18	39
	47	51	45	56	62	49	43	45	40	35	40	51	55	49
Lowville.....	23	28	23	25	41	41	31	32	32	27	26	24	29	39
	43	49	47	54	59	44	38	40	35	34	38	49	50	44
Number Four	16	23	22	24	39	36	32	30	33	26	26	20	28	37
<i>Atlantic Coast.....</i>	42	48	43	40	49	53	48	48	45	47	45	45	43	56
Brooklyn.....	56	66	53	52	61	66	57	56	48	54	57	56	47	71
	34	35	40	34	42	48	43	43	44	41	38	35	26	45
Manhattan Beach	54	51	66	45	47	51	60	53	52	50	52	54	44	50
	30	32	38	38	38	41	42	40	42	40	36	34	34	42
New York City	50	64	51	43	59	59	56	56	46	49	52	50	50	66
	34	36	37	35	42	48	42	42	41	40	36	33	40	45
Willels Point.....	51	66	59	50	58	65	58	57	47	60	56	55	55	70
	33	36	30	36	45	40	38	39	40	37	36	34	38	48
<i>Brentwood.....</i>	57	70	53	53	54	64	58	55	56	58	57	55	58	63
	31	23	23	17	41	44	33	38	41	39	36	35	20	45
Setauket.....	50	63	48	50	57	63	56	54	46	53	52	53	56	67
	35	35	35	28	40	45	40	40	40	38	37	39	32	47
Bedford.....	54	67	56	54	64	64	58	60	45	54	60	56	56	70
	28	26	29	26	38	44	35	35	40	36	34	33	28	45
Primrose.....	51	68	57	55	65	65	61	59	48	55	56	58	58	71
	28	24	29	25	40	44	35	33	43	40	35	36	29	45
<i>Hudson Valley....</i>	40	46	41	41	51	54	47	48	42	43	43	43	44	56
Albany.....	54	60	47	55	66	56	50	52	43	44	48	47	57	63
	30	38	30	28	40	45	41	39	37	37	35	30	35	48
Lebanon Springs..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Honeynead Brook.	48	63	47	56	63	65	53	56	43	46	48	53	55	70
	26	23	27	25	39	44	35	34	39	36	32	28	30	44
Poughkeepsie.....	52	68	51	57	68	65	54	57	44	53	54	57	58	70
	25	22	28	23	39	43	32	38	26	37	33	29	30	44
<i>Wappingers Falls..</i>	54	65	55	56	65	64	58	64	50	52	55	54	50	68
	26	25	31	26	40	48	36	42	40	38	36	34	30	45
Catskill.....	53	62	49	54	63	58	49	53	43	49	50	56	55	70
	29	33	30	25	38	47	41	43	39	38	34	30	32	46
West Point.....	55	55	67	55	52	64	64	56	55	46	52	55	58	55
	32	31	34	28	39	45	42	36	41	39	35	35	32	45
Carmel.....	49	66	51	55	65	61	55	58	47	49	50	55	59	70
	26	29	30	24	42	45	42	41	39	40	34	32	37	45
<i>Mohawk Valley....</i>	38	42	35	43	52	46	41	40	37	35	35	40	45	47
Little Falls (1a)....	50	54	46	54	64	49	44	42	42	35	41	53	54	59
	28	27	27	30	42	36	33	34	31	27	26	32	38	36
Canajoharie.....	51	56	51	59	64	54	49	45	45	43	40	53	61	60
	26	31	29	27	39	43	40	32	35	35	31	27	32	40
St. Johnsville.....	51	55	47	55	64	52	47	46	40	38	44	53	54	52
	24	29	27	24	38	40	38	35	35	33	28	27	29	43
Rome.....	49	54	48	57	65	53	48	49	40	44	47	55	54	50
	25	26	23	38	43	38	32	35	30	27	25	20	40	39

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
38	44	41	41	36	21	34	48	58	58	59	47	36	39	49	53	41.4
46	62	46	60	58	36	56	68	76	60	86	66	44	48	54	64	42.2
40	36	38	36	34	12	12	24	34	44	44	34	30	30	26	34	
42	55	50	54	55	35	52	69	76	63	79	62	37	47	68	70	41.5
32	35	31	40	9	12	22	40	52	46	36	26	25	28	34	43	
44	58	50	57	58	36	53	67	76	77	84	67	40	48	69	72	44.0
36	33	38	34	22	15	22	29	40	46	45	39	30	37	26	38	
40	56	47	55	52	42	50	66	76	80	64	42	67	67	72	70	41.8
31	39	32	41	3	15	21	38	41	32	28	23	21	21	41	49	
44	37	51	42	50	48	27	48	65	70	65	75	57	27	50	62	37.2
34	27	30	30	30	10	11	37	38	41	36	33	24	23	29	26	
42	58	50	56	52	30	53	69	74	66	78	57	40	60	67	59	42.6
35	35	37	32	20	14	25	32	49	55	52	39	26	33	32	41	
39	53	45	52	49	27	50	66	71	69	76	55	34	48	69	70	40.4
33	28	34	30	18	9	20	32	51	53	48	38	22	32	46	40	
53	49	49	49	50	36	40	48	52	57	59	56	43	47	54	59	48.5
62	64	59	63	61	49	58	62	67	68	71	69	52	58	73	70	50.8
47	39	45	40	42	26	32	40	43	50	50	50	38	44	41	54	
62	54	52	55	53	66	43	48	48	52	53	64	59	47	54	64	46.0
46	40	42	38	42	21	26	34	42	44	46	46	38	36	40	48	
59	58	54	54	67	42	51	56	62	69	71	64	44	52	74	71	49.0
44	39	44	40	31	24	33	41	43	51	54	45	38	43	44	54	
61	61	60	64	66	44	51	61	63	69	71	65	46	53	77	73	49.0
37	40	40	42	26	26	35	39	41	46	50	38	36	38	43	48	
61	58	59	59	58	44	55	59	67	64	68	67	48	63	77	76	47.2
45	33	38	33	32	25	17	34	35	45	48	44	34	36	32	39	
66	60	56	57	60	42	54	62	66	71	74	65	49	54	67	73	48.7
44	39	44	40	42	26	31	37	41	48	49	49	40	40	36	42	
58	62	57	61	66	45	58	66	73	76	77	67	46	55	73	77	48.2
43	37	39	37	38	23	20	30	37	44	46	45	36	39	30	42	
69	62	59	61	70	44	60	65	71	76	77	69	47	54	73	74	49.2
47	34	40	41	38	24	23	30	35	45	45	53	38	43	32	42	
48	51	49	48	48	33	38	51	59	65	67	50	42	45	50	59	48.3
48	62	53	60	60	38	57	67	76	79	83	66	43	52	68	73	48.0
41	38	42	39	26	21	26	36	49	57	54	43	35	41	35	46	
45	59	54	55	64	34	52	70	75	82	84	66	42	47	61	73	46.4
42	31	40	36	29	19	20	33	44	55	56	45	34	37	30	37	
51	68	58	60	67	43	59	70	78	81	83	70	48	54	70	74	48.0
38	34	42	31	31	23	20	34	41	51	52	45	37	40	29	38	
65	63	58	63	67	45	58	72	78	81	83	71	50	52	70	77	49.6
40	46	25	38	42	25	23	32	42	45	50	48	38	42	35	42	
48	62	56	58	61	38	51	61	75	73	83	65	47	51	65	71	47.8
42	40	44	39	29	22	24	33	47	53	54	48	35	40	35	48	
71	56	67	62	63	62	45	60	62	74	76	78	67	46	55	73	49.3
43	43	43	39	42	24	26	34	39	47	49	49	37	38	36	46	
55	64	55	58	61	37	55	69	76	80	81	69	45	52	67	74	49.0
45	43	42	36	34	22	20	40	45	53	55	46	36	39	34	49	
42	46	43	46	38	27	40	49	63	63	65	50	29	47	52	58	41.9
41	55	45	58	55	31	53	59	76	72	82	65	41	59	69	70	44.1
33	37	34	34	15	16	29	30	57	54	57	23	29	35	39	52	
60	58	51	54	50	34	52	57	76	75	84	70	47	55	70	70	45.8
38	34	40	26	25	18	26	32	41	52	48	43	33	39	32	42	
46	56	44	56	54	34	51	66	74	72	80	64	47	53	68	70	44.1
37	34	40	35	24	17	23	30	48	54	47	37	31	36	31	40	
50	58	58	55	52	45	52	67	78	75	82	65	54	62	66	70	45.6
29	40	34	40	18	20	35	42	54	50	38	30	30	35	39	53	

TEMPERATURE — APRIL, 1897, SHOWING DAILY MEANS FOR
STATIONS.—

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Champlain Valley</i> .	38	43	35	36	46	50	43	40	36	39	37	39	41	48
Plattsburgh Barracks.	44	50	52	41	50	60	53	42	41	38	38	42	53	52
	30	32	21	21	31	38	33	33	33	32	32	31	29	37
Glens Falls.....	51	60	43	55	65	58	54	51	39	46	44	54	56	58
	25	26	25	21	37	41	26	35	32	34	32	25	27	43
Lake George	54	65	45	52	59	62	48	47	36	48	43	57	55	59
	23	26	25	28	36	38	36	33	34	34	33	26	24	39
<i>St. Lawrence Val.</i> ..	38	40	34	42	49	43	38	40	37	32	37	39	44	45
Madison Barracks..	53	48	50	61	49	43	39	42	38	35	42	48	59	43
	22	30	23	28	40	37	31	31	31	28	27	29	33	36
Canton	49	50	40	60	64	50	45	50	47	35	47	54	57	50
	21	32	22	23	40	37	32	32	32	28	31	26	31	40
North Hammond...	60	52	38	60	56	48	48	48	40	40	46	48	50	50
	26	28	26	26	46	40	34	32	36	34	30	26	36	46
Ogdensburg	50	52	46	55	58	55	44	48	43	37	43	55	55	55
	30	32	25	30	38	36	30	32	32	27	31	30	35	38
Potsdam.....	46	48	38	55	61	48	42	48	39	33	45	48	53	50
	25	33	22	25	38	36	30	32	33	28	29	30	34	40
<i>Great Lakes</i>	37	41	38	44	53	44	38	40	36	35	36	40	50	46
Westfield.....	40	47	38	49	58	65	46	44	37	44	41	47	64	54
	32	25	26	30	26	45	33	34	32	29	25	25	36	38
Buffalo	50	57	48	60	58	38	39	44	42	35	43	51	59	42
	32	34	32	34	37	34	33	33	31	29	29	31	42	35
Pittsford.....	45	56	40	53	65	51	42	50	44	40	41	52	62	54
	28	38	30	27	43	36	33	31	32	29	27	29	38	40
Rochester	47	56	41	61	63	49	40	47	41	37	43	52	62	50
	32	29	23	32	46	37	34	33	33	30	28	29	42	40
Appleton.	43	53	40	63	66	52	40	47	38	41	44	45	65	52
	30	26	33	29	45	39	35	31	32	31	25	26	38	40
Fort Niagara.	43	54	48	58	66	58	58	45	42	41	47	48	61	54
	30	27	33	30	43	36	38	31	32	30	28	28	39	36
Baldwinsville.....	48	54	52	59	67	50	46	49	40	41	46	55	59	54
	27	34	29	31	43	39	35	25	34	31	29	30	37	42
Ridgeway	46	54	46	62	66	49	41	46	40	38	43	52	62	55
	39	28	21	29	47	41	34	33	32	29	27	29	40	41
Oswego.....	42	46	40	59	65	50	38	41	40	37	39	44	57	54
	32	32	30	31	43	37	34	34	32	31	31	30	38	40
Palermo.....	46	49	47	59	67	49	40	48	39	38	48	53	61	52
	25	27	28	29	41	40	31	32	32	31	24	29	32	40
Lyons	46	55	45	58	65	51	42	49	40	40	43	53	60	52
	30	31	31	31	42	38	35	35	33	31	29	31	39	43
Erie, Pennsylvania.	42	49	42	55	64	44	39	43	37	36	42	47	62	47
	30	34	32	35	44	34	34	34	30	31	28	32	46	40
<i>Central Lakes</i>	36	42	40	43	54	47	40	41	38	37	36	40	47	48
Fleming	45	53	56	57	62	52	45	48	43	38	43	52	59	53
	26	31	27	28	42	43	35	32	33	30	26	28	35	42
Romulus.....	51	60	52	57	68	51	47	51	43	47	49	56	60	54
	25	28	28	32	43	44	34	32	34	34	26	25	37	41
Ithaca	47	56	56	56	67	49	44	50	41	39	43	53	58	56
	24	25	27	30	43	43	36	33	34	31	27	26	36	44
Mean	38	42	39	42	51	47	41	42	38	37	37	40	45	48

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
43	44	45	45	44	33	34	45	55	62	61	59	40	42	47	52	44.0
54	36	60	45	60	54	35	53	61	68	64	84	61	44	49	57	42.2
41	31	40	37	40	14	15	30	37	48	40	44	33	31	31	33	
45	62	51	57	56	40	55	65	73	76	86	68	39	50	64	69	44.9
38	33	39	36	25	17	20	28	45	53	47	42	31	37	31	44	
44	63	45	59	55	55	54	61	70	72	84	65	45	49	64	67	45.0
38	31	37	35	26	17	22	34	45	52	45	41	31	39	43	42	
41	45	43	44	36	24	38	53	63	59	59	46	36	51	51	52	43.3
47	53	43	57	43	37	57	73	69	74	70	58	29	35	35	40	42.4
37	39	38	35	36	16	26	38	50	48	46	36	29	35	35	40	
45	59	47	57	53	36	51	73	76	68	75	60	43	61	65	62	43.3
38	32	34	32	17	13	25	21	55	52	50	36	27	34	36	42	
46	54	50	54	58	30	46	70	74	68	68	56	38	76	70	62	44.0
38	30	38	32	24	14	24	40	54	52	58	38	24	30	28	40	
44	55	52	55	65	35	48	72	72	64	68	65	46	66	68	60	44.2
38	34	34	33	15	13	25	36	52	50	48	35	25	35	42	40	
44	58	61	55	35	31	50	71	76	64	69	46	53	75	64	70	42.7
37	33	35	30	16	13	29	35	56	54	39	25	30	39	37	39	
42	48	40	46	39	28	41	60	65	62	61	48	39	47	55	54	45.1
48	55	43	61	40	.....	53	79	76	70	75	58	43	63	70	72	45.1
35	38	33	32	39	22	26	50	57	48	52	40	33	33	50	42	
44	54	42	55	53	32	58	71	71	67	67	52	47	62	74	65	44.0
36	38	34	33	21	21	29	53	52	45	41	37	32	40	50	47	
48	61	45	63	57	37	58	79	73	80	60	46	60	69	63		45.3
37	39	35	31	21	20	26	41	57	56	50	37	31	34	40	43	
49	58	44	63	56	34	55	80	77	70	78	58	47	60	69	58	46.0
38	42	35	32	21	20	27	46	58	59	46	36	32	37	48	44	
53	59	44	60	53	38	45	77	77	72	67	57	47	58	60	56	44.5
36	36	35	29	24	22	27	40	54	54	47	38	33	34	44	43	
52	54	44	59	57	39	54	78	76	71	67	55	51	62	61	55	45.2
34	36	36	31	25	22	29	38	53	54	46	40	34	37	41	43	
44	60	49	64	55	36	59	75	77	74	81	61	49	60	70	75	46.6
37	37	37	33	23	21	28	41	56	57	49	40	30	36	39	47	
51	59	46	58	56	36	55	77	78	69	70	59	42	63	62	56	45.2
37	38	37	35	23	21	28	44	58	51	49	40	32	32	42	44	
42	55	44	60	55	33	51	74	74	65	79	58	41	50	59	67	44.0
37	34	35	34	22	19	27	46	50	54	43	38	32	40	41	43	
40	61	50	64	54	32	54	75	77	70	81	63	47	46	66	68	44.1
35	35	35	32	23	19	25	29	39	56	49	35	32	33	39	45	
45	61	52	63	53	33	57	76	73	73	81	52	47	60	68	64	46.0
40	40	37	33	22	21	28	47	54	58	51	37	33	35	41	46	
49	50	38	61	59	33	57	76	75	72	71	58	44	58	65	68	45.0
38	38	33	33	23	21	27	54	55	54	48	37	35	37	48	44	
41	48	45	47	39	28	40	60	66	66	67	51	39	44	55	60	46.3
45	60	52	62	55	33	53	74	76	74	83	59	46	58	68	74	45.7
37	36	38	31	22	20	24	45	54	58	50	42	30	31	41	48	
44	62	50	62	56	38	57	75	79	75	82	62	49	61	72	73	47.0
37	36	37	31	22	19	26	16	51	57	53	39	31	23	40	46	
44	58	51	61	54	35	59	73	77	75	82	62	46	60	70	74	46.2
37	35	40	36	24	20	23	48	56	57	53	41	32	34	41	46	
43	46	44	46	41	29	38	53	61	62	62	51	40	46	51	56	45.1

DAILY AND MONTHLY PRECIPITATION

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau.</i>	0.00	0.00	T.	T.	0.26	0.08	0.08	0.05	0.79	0.02	0.00	T.	0.06	0.09
Alfred30	.10	.17	.03	.87	T.	.....	.....	.12	T.
Angelica62	.12	.26	.06	.46	T.	.....	.....	.16	T.
Bolivar37	.15	.04	T.	.82	T.	.....	.....	T.	.10
Friendship42	.05	.02	.05	1.01	T.	.....	.....	.09	T.
Franklinville	T.	.10	.09	.12	.01	.81	.07	.....	.....	.13	.30
Humphrey01	.03	T.	.08	.03	.35	.....	.....	.....	.05	.02
Little Valley
Cherry Creek	T.	.27	.13	.06	T.	.73	.11	.....	.....	.17	.37
Jamestown02	.38	.10	.05	.12	1.50	.10	.....	.....	.15	.30
Elmira37	.10	.....	.08	.95	.....	.....	.....	.....	.....
Pine City20	T.	.....	1.26	.....	.....	.....	.....	.....
Akron	T.	.06	.....	*	1.00	.04	.....	.....	T.	T.
Avon19	.05	T.	.....	.58	.....	.....	T.	.06	T.
Mt. Morris	T.	.30	T.	T.	.....	.90	.....	.....	.....	T.	.....
Lockport	T.	.....	T.	T.	.....	.....	.50	.....	.....	.....	.13	.48
Victor
Tyrone
Wedgewood	T.	.24	.06	.09	.05	1.03	T.	.....	.....	T.	.....
Addison	T.	.30	.04	.11	.03	.88	T.	.....	.....	T.	.....
Atlanta41	.07	.09	T.	.40	.....	.....	.....	.....	T.
Haskinville	T.	.20	.10	.20	.05	.61	T.	.....	.....	T.	T.
South Canastota	T.	.52	.05	.20	.50	.88	.....	.....	.....	.05	.....
Arcade	T.	.28	.12	.15	.01	.51	.02	.....	.....	.13	.17
Attica
<i>Eastern Plateau.</i>	0.00	0.00	0.00	0.02	0.13	0.16	0.09	0.10	0.87	0.06	0.00	0.00	0.01	0.04
Binghamton (1)11	.17	.03	T.	.98	T.	.....	.....	.....	.....
Binghamton (2)09	.17	T.	.02	.80	T.	.....	.....	.....	.....
Oxford10	.21	.07	.07	1.27	.05	.....	.....	.....	.....
Cortland	T.	.11	T.	T.	.47	T.	.....	.....	.....	.....
South Kortright17	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brookfield
Middletown
Port Jervis10	.08	.06	.04	.42	.89	.....	.....	.02	.30
Warwick12	.....	.....	.....	1.68	.....	.....	.....	.....	.....
Cooperstown27	.19	.10	.....	1.30	.....	.....	.....	.02	.....
Garrattsville41	.73	.64	.38	.....	.....	.....	.....	.....	.....
New Lisbon18	.06	.04	.03	1.03	.03	.....	.....	.....	.....
Oneonta13	.04	.....	.14	.81	.97	.....	.....	.....	.03	.31
Perry City30	.09	.02	.05	.76	.04	.....	.....	.....	.....
Newark Valley03	.60	.....	.02	1.12	.....	.....	.....	.....	.....
Straits Corners02	.12	.15	.18	.02	.80	.03	.....	.....	.....	.....
Waverly03	.46	.18	.04	.04	.98	.02	.....	.....	T.	.....
Dryden09	.32	.05	.03	.69	T.	.....	.....	.....	.....
Mohonk Lake15	.....	.....	.12	.....	1.15	.....	.....	.....	.13	.....
<i>Northern Plateau.</i>	0.00	0.00	0.00	0.11	0.24	0.12	0.04	0.04	0.64	0.21	T.	0.00	0.06	0.19
Elizabethtown25	.25	T.	T.	1.00	.40	.....	.....	.....	.10
Saranac Lake	T.	.29	.11	.08	.04	.52	.04	.....	.01	.....
Gloversville23	.04	T.	.....	1.23	.09	T.	.....	.....	.09
Little Falls (2a)35	.26	.05	.04	.20	.79	T.	.....	.....	.....	.16
North Lake50	.40	.10	.10	.....	.30	.....	.....	.....	1.00
Lowville16	.04	.04	.....	.74	.13	.....	.....	.....	.19
Number Four	*	1.60	.03	.04	.....	.41	.....	.....	.13	.....
Kings Station25	.04	.....	.....	1.00	.12	.....	.....	.30	.....
<i>Atlantic Coast.</i>	0.00	0.00	0.00	0.06	0.42	0.10	0.03	0.19	1.20	0.14	0.08	0.05	T.	0.04
Brooklyn	T.	.48	.14	T.	.....	1.34	.....	.....	.....	.16	.....
Manhattan Beach18	.60	.....	.98	.60	.10	.01	.01
New York City	T.	.45	.06	T.	T.	1.20	.01	.....	.12	.....	.....
Wilets Point50	.30	.....	T.	.70	.50	.....	.....	.....	.....	.30

TATION FOR APRIL, 1897 — (INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.18	0.02	0.05	T.	0.03	0.01	T.	0.02	0.06	0.02	0.48	0.15	0.02	0.01	0.00	T.	2.50
.17	.02	.10		T.	.05		.01		.11	.38	.30	.06				2.69
.12	.10	.14	.03	.05				T.	.03	.70	.30	.05	.12			3.15
.13	T.	.02		T.				T.	.02	.56	.21	.09				2.48
.23	T.	T.		T.	T.			T.	T.	.65	.20	.05			T.	2.77
.02	.02	.11		.06	T.			.05	.02	.50	.30	.05				2.76
T.	T.	.06		.14	T.			.02		.50	.10					1.39
	.11	.37		.06	.02			T.	.05	.38	.38					3.11
	.06	T.		.14	T.			T.	.10	.60	.15	T.				3.77
.78		.02														2.30
.85	T.	.05					T.			.49	.10					2.95
T.	T.	.06		T.	.11		.33			.19						1.79
T.				T.			T.	.10		.16	.07					1.21
.10	T.	T.		T.				.50		.30	T.					2.10
										.55	.32					1.98
.34	.02	.02	T.	.03	T.		.02	T.	.03	.65	.14					2.72
.28	T.	T.		.01	T.		.01	T.		.61	.06	.08				2.41
.04				.04						.65	.22					1.92
.20	T.			T.	T.	.10				.70	.10					2.25
.30	.03	T.		T.		.10	.05			.30	.15					3.13
T.		.09		.05	.03		T.	.42		.80	.28	T.			T.	3.06
0.74	0.02	0.15	T.	0.02	0.02	0.00	T.	T.	T.	0.21	0.13	T.	T.	0.00	0.00	2.77
.77		.08			.02					.12	.05					2.33
.68	T.	.05		T.	.04		T.	T.		.01	.12	T.				1.98
1.18		.13		.08				T.	T.	.20	.40					3.76
.09		T.		T.					T.	T.	.01					0.68
2.04		.41		.13						.10	.06					2.91
.41		.37								.38	.04					3.11
.92		.35									.17		T.			3.24
.98		.40		.03						.09	.25		.02			3.65
.70										.25		.04				3.15
.96		.19								.04	.07	T.				2.63
.37	.27									.19						3.26
.34		.03		.05	.05				T.	.75	.08					2.56
.86		.02		T.	.05			T.		.25	.13					3.08
.82		.04		.01	.10		.01	T.		.10	.28					2.63
.84	.01	T.		.01			T.	T.		.40	.09					3.10
.43	T.	.02	.02		.03		T.		.02	.68	.44					2.82
.18		.39														2.12
0.63	0.10	0.32	T.	0.16	0.09	0.00	T.	0.04	0.13	0.30	0.09	0.09	0.07	0.01	0.01	2.72
1.00	.50	.50		.40								.05	.20	.10		4.75
.78	.10	.29		.21				.33	.10	.50	.12	.26	.01			3.79
.89		.43		.10			T.			T.	.16	T.	.02			3.28
.56	.21	.08	T.	.09					.25	.30	T.			T.	.10	3.50
.10					.70					.55		.05				3.80
.24		.12		.30					.23	.48	.26	.04				2.97
.40		.70		.08					.45	.60	.15	.34				3.93
1.05		.45		.12									.35			3.68
0.42	0.09	0.35	0.00	T.	0.00	0.00	0.00	0.00	0.00	T.	0.03	0.04	T.	0.00	0.01	3.31
.51		.04									.03	.05	T.			2.75
.20	.26									.02	.04					3.26
.54		.50		T.							.02	.06	T.			2.96
.29	.47									T.	.10				.05	3.21

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan Coast—(Con.)</i>														
Brentwood.....					1.20	.40		*	12.00					
Setauket.....					.53	.10	.04	T.	2.03	.06				
Bedford.....					.12	.09	.04	.02	1.82	T.				T.
Primrose.....					.25		T.		1.48					
<i>Hudson Valley.....</i>	0.00	0.00	0.00	0.00	0.10	0.04	0.03	0.04	1.10	0.12	0.00	0.00	0.00	0.02
Albany.....					.01	.21	T.	T.	1.20	.06				.02
Lebanon Springs..														
Honeymead Brook..					.20	.02	.02	.08	1.49					
Poughkeepsie.....					.10		.05		.16					
Wappinger's Falls..					.05	.06	T.	.03	1.58	.06				.05
Catskill.....					.20		.03		1.40					.07
West Point.....					.10	.05	T.	.05	.85	.80				T.
Boyd's Corners.....														
Carmel.....					.07			*	1.59					
South-east Reserv'ir														
Eagle Mills.....					.10		.15	.10	1.00					
Easton.....														
<i>Mohawk Valley....</i>	0.00	0.00	0.00	0.19	0.23	0.15	0.02	0.16	0.45	0.02	0.00	0.00	0.02	0.04
Little Falls (1a)...				.19	.18	.30		.29	.81					.15
Canajoharie.....					.13	.10								
St. Johnsville.....					.20	.10	.04	.05	.50	.07				
Rome.....				.60	.40	.10	.04	.32	.50				.06	
<i>Champlain Valley..</i>	0.00	0.00	0.00	0.00	0.21	0.10	0.02	0.02	1.21	0.04	0.03	0.00	0.00	0.06
Plattsburgh Bar'ks..					.14	.16	.06	.04	*	1.68	.06			T.
Glens Falls.....					.21	.08	T.		1.17	.03				.16
Lake George.....					.27	.05	T.	.04	1.25	.09	T.			.13
<i>St Lawrence Valley</i>	0.00	0.00	0.00	0.00	0.30	0.10	0.02	0.00	0.24	0.14	T.	0.00	0.07	0.03
Madison Barracks..					.32	.14			.32				.15	*
Watertown.....														
Canton.....					.16	.22				.39			.02	
DeKalb Junction...					.17	.10	.07		.22	.09				.02
North Hammond...					.21	.06			.33	.12	T.		.11	.08
Ogdersburg.....					.63		.01		.34	.10			*	1.30
Potsdam.....														
<i>Great Lakes.....</i>	0.00	0.00	0.00	0.05	0.24	0.15	0.05	0.03	0.59	0.10	T.	0.00	0.13	0.14
Westfield.....						.70	.25		.40				.85	
Buffalo.....				.04	.07	.23	.09	.01	.40	.03			.23	.61
Adams Centre.....														
Pittsford.....					.31	.01	T.		1.15				T.	
Rochester.....				T.	.26	.06	.02		.45	.10	T.		.10	.10
Scottsville.....				.34					1.00					.16
Appleton.....				T.	.06	T.	.04		.83	.03			.16	.18
Fort Niagara.....				.16		.04			.60				.31	
Niagara Falls.....				.02	T.	.27	.09	T.	.84				.20	.34
Baldwinsville.....				.24	.48	T.		.24	.36				.04	
Skaneateles.....				.40	.34	.07			.70	.05				
Ridgeway.....					.08	.18	.04		.56	.04			.27	.40
Demster.....														
Fulton.....					.70		.04		.05	.90			.05	.25
Oswego.....					.55	T.	.05	T.	.77	.11			T.	.05
Palermo.....					.25	T.	T.		.29				.01	
Phoenix.....					.20	.52	.08		.39	.34				.01
Lyons.....				.18	.44	.07	.01	.30	.52				.06	
Rose.....				T.	.55	.05	.02		.74	.10			T.	.08
Erie, Pa.....				T.	.03	.20	.05		.57	T.			.02	.30

TATION FOR APRIL — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
.50	.....	.80	.....													4.90
.27	.....	.26	.....	T.							T.	T.	T.			3.29
.46	.....	.53	.....	.02							.05	.06	.01			3.22
.61	.....	.41	.....							T.		.11	.02			2.88
0.70	0.05	0.41	0.01	0.03	0.00	0.00	0.00	0.00	T.	0.08	0.06	0.19	0.10	0.02	0.00	3.10
.67	.01	.38	.....	.02					.01	.04	.09	T.	.40			3.12
.75	.....	.46	.....	.02								.19		.10		3.33
.66	.....	.28	.....	T.							.05	T.				1.30
.62	.....	.51	.....								.64	T.	.05			3.05
.56	.....	.32	.....	T.						47.			.15			3.20
.40	.40	.20	.05								.10	.05	.05	.05		3.15
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.78
.77	.....	.50	.....								.12					3.05
1.20	.....	.60	.....	.16							.15	.05	1.25	.17		3.05
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.97
0.68	0.11	0.38	0.00	0.16	0.00	0.00	0.00	0.00	T.	0.16	0.16	T.	T.	0.00	0.00	2.92
.73	.25	.70	.....	.50						.14	.23					4.47
.79	.....	.42	.....	T.					T.	T.	.12		T.			1.56
.81	.02	.34	.....	.03							.12	.02				2.30
.40	.16	.05	.....	.10						.48	.15					3.36
0.60	0.01	0.38	0.13	0.08	0.00	0.00	T.	0.00	0.01	T.	0.03	T.	.44	0.01	0.00	3.38
*.73	+.71	.04	.38	.....					.04	T.			.33	.03		2.67
.96	.....	.40	.....	.12							T.	T.	.48			3.61
.85	.02	.40	.....	.13			T.			T.	.10	.01	.51			3.85
0.26	0.00	0.25	0.00	0.32	0.00	T.	0.00	0.10	0.37	0.25	0.15	0.10	0.00	0.00	0.00	2.74
+.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.16
.34	.....	.42	.....	.18				.02	.58	.38	.25	.20				3.16
.20	.....	.32	.....	.27					.63	.45	.21	.06				2.81
.15	.....	.19	.....	.26					.66	.12	.10	.18				2.57
.34	.....	.32	.....	.30		T.		.48		.32	.19	.05				3.98
.....
0.07	0.07	0.06	T.	0.03	0.01	0.01	0.01	0.13	0.15	0.20	0.14	0.01	0.00	0.00	T.	2.36
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	2.99
T.	.03	.09	.....	.06	.02		.01	.49	.26	.15	.12	.01			T.	2.56
.....
.....	.04	.10	.....	.02			T.	T.	.14	.17	.20					2.23
T.	.05	.05	.....	.05	.03		.01	T.	.13	.15	.07				T.	1.63
.....	.....	T.	.....	T.				.10		.30	.08					1.98
.....	.12	.06	.....	T.			T.	.07	.71	.24	.08				T.	2.58
.....
.....	.14	.10	.....	.....				.90		.22	.12					2.40
.04	.....	.04	.....	.....			.09	.15	.70	.20	.10					3.06
.19	.04	.09	.....	T.		.03		.08		.39	T.					2.18
.53	.....	.23	.....	.12				.12		.35	.25					3.16
.....	.04	.06	.....	.06			.01		.54	.24	.09	.01				2.62
.....
.....	.18	.....	.....	.....							.25					2.42
.24	T.	.03	.....	.16	T.		T.	T.	.66	.31	.13				T.	2.46
.....
.08	.25	.....	.....	.01				.20		.15	.25					1.49
.....	.21	.04	.....	.11	.02				.10	.02	.20	.15				2.39
.11	.....	.06	.06	T.		.05		.04		.22	.02					2.14
.15	.....	.15	.....	.11			T.	.24	T.	.25	.08					2.52
.....	.05	.08	.....	.01	T.		T.	.02		.10	.09				.03	1.55

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.00	0.00	0.00	T.	0.27	0.40	0.04	0.08	0.67	T.	0.00	0.00	0.01	0.00
<i>Fleming</i> .....	.....	.....	.....	.....	.30	1.00	.....	.....	.43	.....	.....	.....	.....	.....
<i>Sherwood</i> .....	.....	.....	.....	.....	.34	.34	.08	.80	.25	.....	.....	.....	.03	.....
<i>Watkins</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Romulus</i> .....	.....	.....	.....	T.	.20	.16	T.	T.	1.15	.....	.....	.....	.....	.....
<i>Ithaca</i> .....	.....	.....	.....	.....	.23	.12	.10	T.	.86	T.	.....	.....	.....	.....
Average	0.00	0.00	T.	0.04	0.24	0.14	0.04	0.07	0.77	0.08	0.01	T.	0.04	0.06

1 Record for the month incomplete.
 polated from values at other stations.

|| Received too late to be included in the averages.

TATION FOR APRIL — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.25	0.02	0.07	0.00	0.04	0.07	0.00	0.00	0.04	T.	0.24	0.20	T.	0.00	0.00	0.00	2.42
.....	.....	.....	.....	.10	.15	.....	.....	T.	.....	.23	T.	.....	.....	.....	.....	2.21
.25	.08	.05	.....	.....	.....	.....	.....	.06	.....	.08	.61	.....	.....	.....	.....	2.47
.....
.31	T.	.24	.....	T.	.09	.....	.....	.12	.....	.16	.10	.....	.....	.....	.....	2.53
.46	T.	T.	.....	.05	.03	.....	.....	.....	T.	.51	.11	T.	.....	.....	.....	2.47
0.45	0.05	0.23	0.01	0.09	0.02	T.	T.	0.04	0.07	0.19	0.11	0.04	0.06	T.	T.	2.92

* Amount included in next measurement.

† Not included in computing averages.

§ Inter-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).									
		Normal for the month of April.	Length of record, years.	Record begins.	Record ends.	Mean for April, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR APRIL.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		43.9	...	...	...	45.1	+1.2	...	...	...	...
Angelica.....	Allegany.....	42.8	15	1855	1897	43.4	+0.6	48.2	1896	35.9	1857
Humphrey.....	Cattaraugus ..	43.1	14	1884	1897	43.6	+0.5	49.0	1896	37.6	1884
Elmira.....	Chemung.....	45.9	19	1851	1897	48.3	+2.4	54.2	1896	38.5	1857
<i>Eastern Plateau.</i>		43.0	...	...	...	44.4	+1.4	...	...	...	...
Oxford.....	Chenango.....	44.0	30	1828	1897	44.1	+0.4	51.6	1844	37.6	1838
Cortland.....	Cortland.....	42.1	34	1829	1897	43.2	+1.1	48.0	1840	34.6	1857
Cooperstown ..	Otsego.....	41.0	44	1854	1897	42.2	+2.2	51.6	1878	33.6	1874
Waverly.....	Tioga.....	45.1	15	1883	1897	46.9	+1.8	51.0	1896	42.0	1885
<i>Northern Plateau</i>		42.9	...	...	...	42.6	-0.3	...	...	...	...
Lowville.....	Lewis.....	42.9	32	1827	1897	42.6	-0.3	51.0	1833	34.3	1857
<i>Atlantic Coast.</i>		47.6	...	...	...	48.8	+1.2	...	...	...	...
New York city.....	New York.....	48.0	27	1871	1897	49.0	+1.0	53.6	1871	41.3	1874
Setauket.....	Suffolk.....	47.2	12	1886	1897	48.7	+1.4	49.8	1891	44.7	1888
<i>Hudson Valley</i>		46.6	...	...	...	47.9	+1.3	...	...	...	...
Albany.....	Albany.....	46.2	24	1874	1897	48.0	+1.8	51.5	1878	36.6	1874
Honeymead Brook	Dutchess.....	45.7	17	1881	1887	46.4	+0.7	50.5	1886	40.4	1887
West Point.....	Orange.....	47.9	68	1826	1897	49.3	+1.4	...	...	...	...
<i>Champlain Valley.</i>		41.4	...	...	...	42.2	+0.8	...	...	...	...
Plattsburgh Barracks.	Clinton.....	41.4	43	1839	1897	42.2	+0.8	48.2	1814	35.6	1841
<i>St. Lawrence Valley.</i>		42.6	...	...	...	43.0	+0.5	...	...	...	...
Madison Barracks....	Jefferson.....	42.3	36	1839	1897	42.4	+0.1	52.8	1878	34.1	1874
Canton.....	St. Lawrence..	42.5	36	1862	1897	43.3	+0.8	52.4	1878	33.7	1868
North Hammond.....	".....	42.1	19	1867	1897	44.0	+1.9	48.8	1871	33.3	1874
Potsdam.....	".....	43.3	30	1828	1897	42.1	-0.9	56.2	1839	37.0	1841
<i>Great Lakes</i>		42.9	...	...	...	45.0	+2.1	...	...	...	...
Buffalo.....	Erie.....	42.1	27	1871	1897	44.0	+1.9	50.0	1878	34.5	1874
Rochester.....	Monroe.....	43.8	27	1871	1897	46.0	+2.2	52.5	1878	35.4	1874
Fort Niagara.....	Niagara.....	42.7	41	1812	1897	45.2	+2.5	49.9	1878	35.6	1874
Baldwinsville.....	Onondaga.....	43.8	21	1851	1897	46.6	+2.8	49.9	1896	38.6	1857
Oswego.....	Oswego.....	41.8	27	1871	1897	44.4	+2.6	52.4	1878	36.8	1874
Palermo.....	".....	41.7	44	1851	1897	41.1	+2.4	50.0	1878	32.4	1874
Erie, Pennsylvania ..	Erie.....	44.4	24	1874	1897	45.0	+0.6	50.4	1878	37.0	1874
<i>Central Lakes</i>		44.5	...	...	...	46.2	+1.7	...	...	...	...
Ithaca.....	Tompkins.....	44.5	19	1879	1897	46.2	+1.7	50.4	1896	41.3	1888
Average departure ..		...	...	...	...	...	+1.3	...	...	...	...

AND PRECIPITATION — APRIL.

STATION.	COUNTY.	PRECIPITATION — (INCHES).									
		Average for the month of April.	Length of record, years.	Record begins.	Record ends.	Total for April, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR APRIL.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau</i>		3.09	...	...	...	2.28	-0.81	...	...	...	...
Angelica.....	Allegany.....	3.11	13	1857	1897	3.15	+0.04	4.40	1857	0.90	1872
Humphrey.....	Cattaraugus ..	2.97	14	1884	1897	1.39	-1.58	5.61	1893	1.31	95-96
Elmira.....	Chemung.....	3.18	19	1851	1897	2.30	-0.88	6.51	1857	0.77	1896
<i>Eastern Plateau</i>		2.84	...	...	...	2.86	+0.02	...	...	...	...
Oxford.....	Chenango.....	2.99	27	1829	1897	3.76	+0.77	7.11	1854	0.33	1833
Cortland.....	Cortland.....	3.48	18	1851	1897	0.68	-2.80	6.78	1857	0.68	1897
Cooperstown ..	Otsego.....	2.63	44	1854	1897	3.65	+1.02	7.12	1854	0.92	1863
Port Jervis.....	Orange.....	2.90	14	1880	1897	3.11	+0.21	4.67	1895	1.12	1881
Waverly.....	Tioga.....	2.20	15	1833	1897	3.10	+0.90	4.63	1894	0.87	1892
<i>Northern Plateau</i>		2.18	...	...	...	2.97	+0.79	...	...	...	...
Lowville.....	Lewis.....	2.18	34	1827	1897	2.97	+0.79	5.74	1857	0.35	1830
<i>Atlantic Coast</i>		3.10	...	...	...	2.50	-0.60	...	...	...	...
New York city.....	New York.....	3.09	27	1871	1897	2.96	-0.13	7.02	1874	1.00	1881
Setauket.....	Suffolk.....	3.10	12	1886	1897	2.03	-1.07	4.95	1393	1.02	1896
<i>Hudson Valley</i>		2.79	...	...	...	2.74	-0.05	...	...	...	...
Albany.....	Albany.....	2.45	24	1874	1897	3.12	+0.67	4.97	1874	0.56	1892
Honeymead Brook ..	Dutchess.....	2.14	17	1881	1897	3.33	+1.19	4.25	1895	0.71	1892
Poughkeepsie.....	".....	2.39	22	1830	1897	1.30	-1.09	5.85	1831	0.61	1892
West Point.....	Orange.....	3.71	51	1840	1897	3.15	-0.56	10.53	1854	0.50	1844
Boyd's Corners.....	Putnam.....	3.26	27	1870	1897	2.78	-0.48	6.31	1874	1.08	1892
<i>Champlain Valley</i>		1.82	...	...	...	2.67	+0.85	...	...	...	...
Plattsburgh Barracks..	Clinton.....	1.82	38	1840	1897	2.67	+0.85	5.25	1840	0.30	1881
<i>St. Lawrence Valley</i> ..		1.89	...	...	...	1.86	-0.07	...	...	...	...
Madison Barracks.....	Jefferson.....	1.75	37	1841	1897	1.16	-0.59	4.90	1889	0.38	1896
North Hammond.....	St. Lawrence..	2.12	20	1866	1897	2.57	+0.45	5.60	1867	0.65	1870
Potsdam.....	".....	1.81	28	1828	1896	...	...	4.18	1889	0.20	1830
<i>Great Lakes</i>		2.11	...	...	...	2.03	-0.08	...	...	...	...
Buffalo.....	Erie.....	2.43	27	1871	1897	2.56	+0.13	4.71	1878	0.76	1881
Rochester.....	Monroe.....	2.40	27	1871	1897	1.63	-0.77	4.99	1874	0.94	1884
Fort Niagara.....	Niagara.....	1.88	40	1842	1897	2.49	+0.61	4.20	1842	0.21	1887
Oswego.....	Oswego.....	2.05	27	1871	1897	2.46	+0.41	3.66	1886	0.85	1879
Palermo.....	".....	1.47	28	1860	1897	1.49	+0.02	6.20	1863	0.26	1879
Erie, Pennsylvania....	Erie.....	2.41	24	1874	1897	1.55	-0.86	3.86	1880	1.14	1893
<i>Central Lakes</i>		2.09	...	...	...	2.47	+0.38	...	...	...	...
Ithaca.....	Tompkins.....	2.09	19	1879	1897	2.47	+0.38	4.84	1894	1.02	1896
Average departure.		...	...	...	...	-0.09	...	...	...	...	...

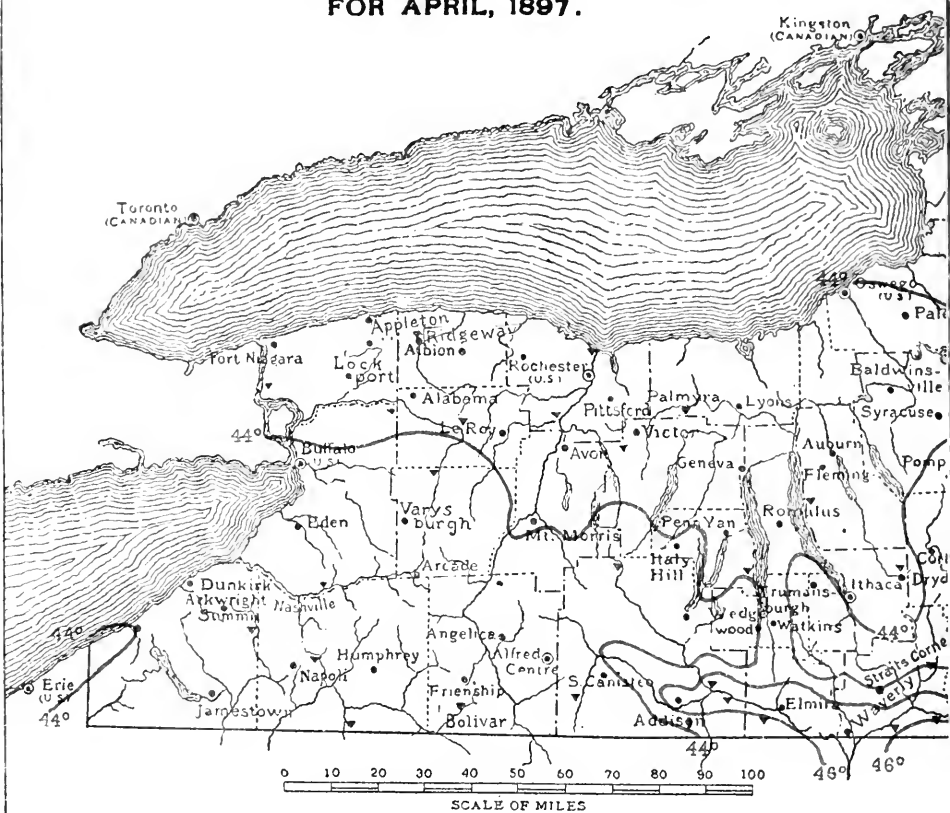


MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR APRIL, 1897.



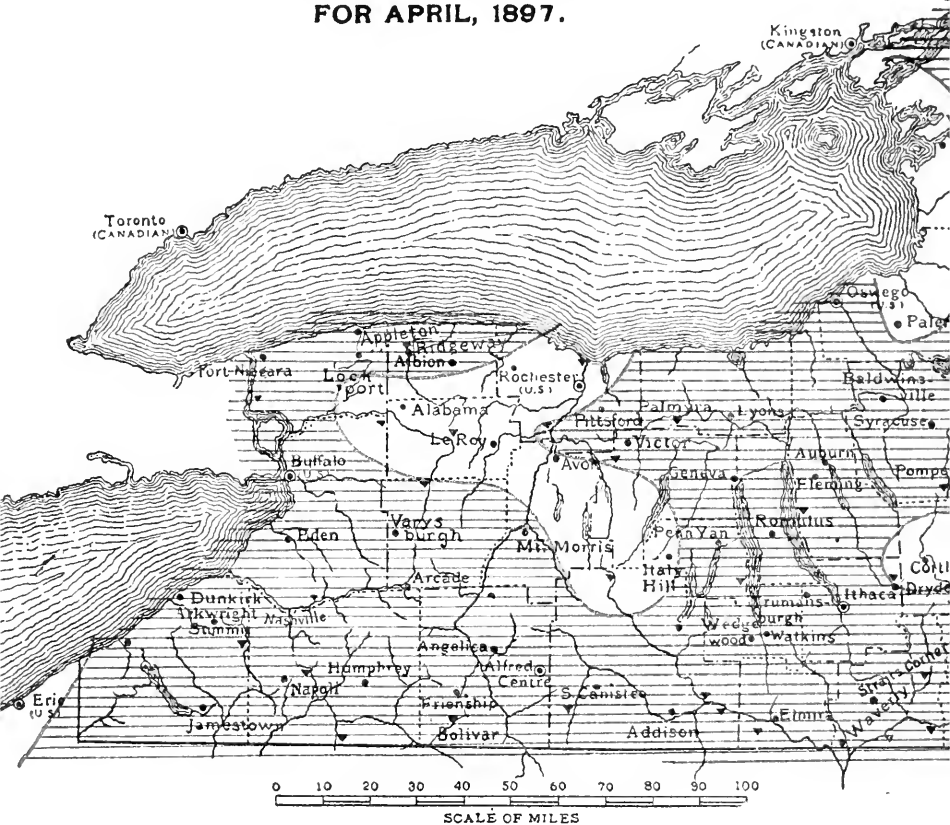


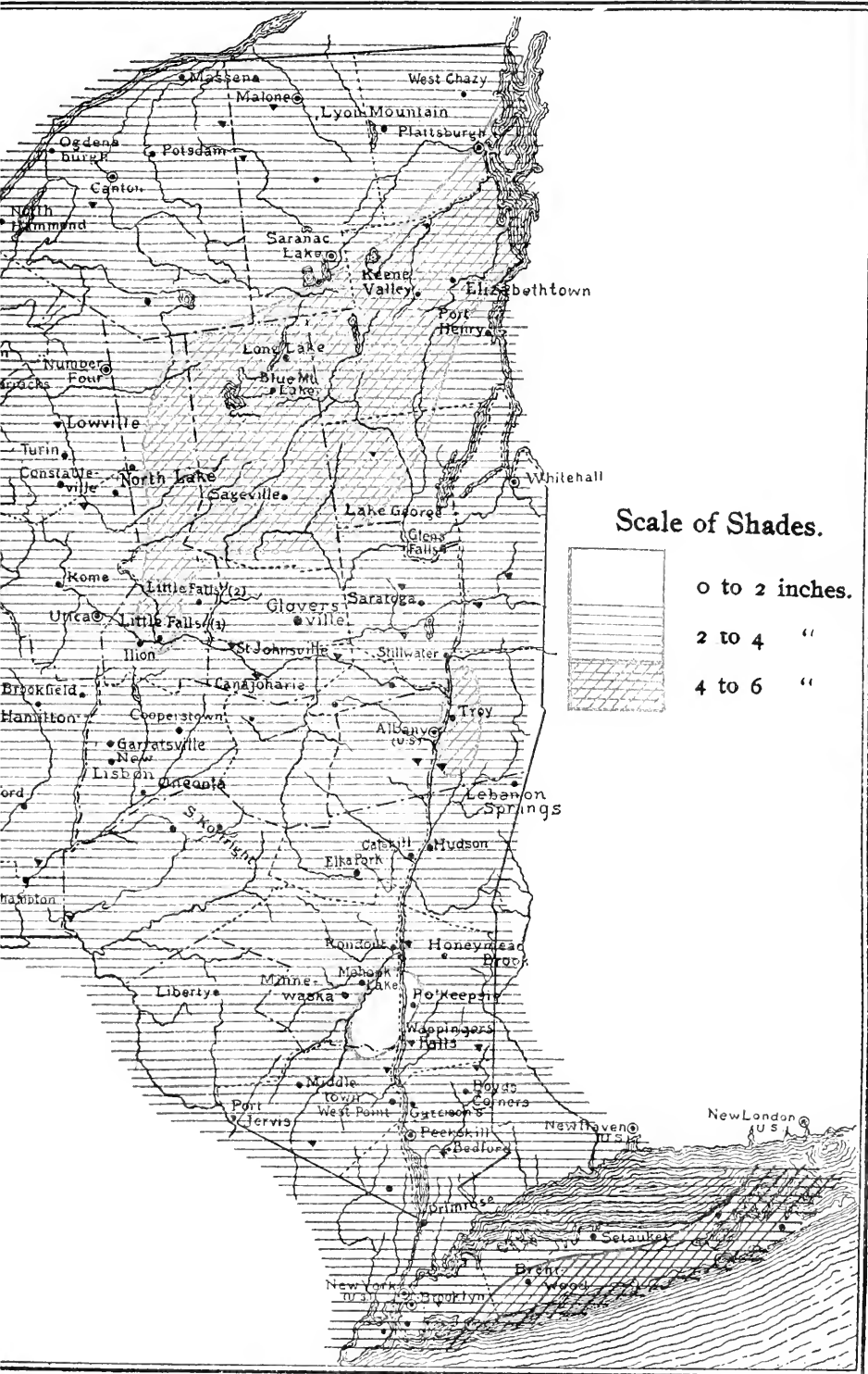
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR APRIL, 1897.





Meteorological Summary for May, 1897.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York during May, 1897, was 29.96 inches. The highest barometer was 30.42 inches at Albany on the 8th, and the lowest was 29.51 inches at Buffalo on the 2d. The highest mean pressure was 29.98 inches at Erie, Pa., the lowest being 29.94 inches at Oswego. The average pressure at six stations of the National Bureau was 0.03 inches below the normal, the maximum departure being —.06 inches at New York City, while at Erie the pressure was normal.

The mean temperature of the State was 55.6 degrees, as derived from the records of 76 stations; the highest monthly mean being 61.1 degrees at Wappingers Falls, and the lowest, 50.0 degrees, at Little Falls (Station 2a). The highest daily mean for the State was 62 degrees on the 12th, 20th and 24th, the lowest being 48 degrees on the 8th. The maximum temperature reported was 87 degrees at West Point on the 11th, and the minimum 23 degrees at Saranac Lake on the 7th. The mean monthly range of temperature for the State was 47 degrees; the greatest value being 57 degrees at Waverly, and the least, 29 degrees, at Brooklyn. The mean daily range was 21 degrees; the greatest daily range being 52 degrees at Oneonta on the 9th, and the least, 3 degrees, at Erie, Pa., on the 7th. The mean temperatures of the several regions were as follows: The Western Plateau, 54.2 degrees; the Eastern Plateau, 55.0 degrees; the Northern Plateau, 52.1 degrees; the Atlantic Coast, 58.7 degrees; the Hudson Valley, 59.0 degrees; the Mohawk Valley, 56.0 degrees; the Champlain Valley, 55.4 degrees; the St. Lawrence Valley, 54.8 degrees; the Great Lakes, 54.7 degrees; the Central Lakes, 55.8 degrees. The average of the mean temperatures at 25 stations possessing records for previous years was 0.8 degrees below the normal, deficiencies occurring at all but 6 stations.

The mean relative humidity was 70 per cent. The mean dew point was 45 degrees.

The average precipitation for the State was 4.14 inches of rain, as derived from the records of 100 stations. The heaviest general precipitation, ranging from 6 to over 9 inches, obtained in a portion of the Coast Region, while the least was under 2 inches through a considerable area south of Lake Ontario. The maximum local amount was 9.83 inches at Bedford, and the least, 1.33 inches, at Rochester. The principal rain periods occurred between the 1st and 5th, on the 10th, 12th to 14th, the 20th and 21st, the 23d and 24th, the 28th and 29th. No snow was reported. The average total precipitation at 27 stations possessing records for previous years was 0.54 inches above the normal amount, deficiencies occurring at 8 scattered stations, mainly in the Lake Region. The largest excess obtained in the Southeastern section. The average number of days on which the precipitation amounted to 0.01 inches or more was 9.6, the rain frequency being greatest in the vicinity of the Mohawk Valley and Lake Erie, and least along the eastern border. The average number of clear days was 9.6; of partly cloudy days, 10.4; and of cloudy days, 11.0; giving an average cloudiness of 50 per cent. for the State. The maximum cloudiness obtained in eastern New York, north of the Coast Region, and the least in the central part of the State.

The prevailing wind direction was from the west. The average wind travel at 6 stations of the National Bureau was 7,740 miles, the values being greater than usual in eastern New York, and about the usual average along the lakes. The maximum velocity reported from the above stations was 48 miles per hour at New York City and Buffalo on the 2d and 14th, respectively.

Thunderstorms (including distant thunder or lightning) were observed as follows: On the 1st at North Hammond; 2d, Manhattan Beach; 3rd, Wedgewood and Ithaca; 4th, St. Johnsville;

5th, Manhattan Beach; 9th, 8 western stations; 10th, 6 southeastern stations; 11th, Angelica; 12th, 10 western, central and southeastern stations; 13th, Manhattan Beach; 14th, 5 western, central and northern stations; 20th, 7 western, central and northern stations; 21st, 3 coast stations; 23d, 8 western, central and southeastern stations, and on the 24th, 5 stations in the same territory; 25th, Bedford; 30th, 3 coast stations; 31st, 2 coast stations.

Hail fell at New Lisbon on the 3d.

Solar halos were observed on the 11th, 16th, 17th and 26th; and Lunar halos on the 11th, 12th, 13th, 16th and 17th.

Light frosts were noted on 13 dates. The principal severe or killing frosts occurred on the 8th, 17th, 22d, 26th and 27th.

GENERAL FEATURES OF THE WEATHER.

The month, as a whole, was cooler than usual, the average temperature for the first and last decades being low, and during the intermediate period about normal. There was an excess of rainfall for the State, but its distribution was uneven, numerous and heavy showers occurring in the southeast and over other scattered sections, while in other localities, notably in the vicinity of Lake Ontario, the rainfall was very light. About the usual cloudiness obtained for the State at large, but the percentage was above the average in portions of the southeastern and northern regions. Thunderstorms occurred frequently in the southern and central counties.

Four areas of high and five areas of low pressure (approximately) influenced our weather conditions this month. Both high and low systems were sluggish in movement, and less energetic than in previous months, the range of pressure being smaller than usual. The following is a brief account of the pressure systems of the month:

Low I, 29.6 to 29.8 inches over the Northeastern States from the 2d to 5th; general rains, some heavy showers in the Southeast. A fall of 15 degrees in daily temperature between 1st and 4th, due to

High I, 30.4 inches, a large area moving slowly to the eastern States before the 6th, passing slowly northeastward on the 7th and 8th, bringing severe frosts and fair weather, and on the 9th moving to the southeast coast, giving a warm wave in conjunction with

Low II, 29.6 inches, reaching Canada from the west on the 9th, and shifting slowly over and north of New York until the 15th. General rains with thunderstorms occurred during this period, the maximum amounts for the month, with very heavy showers in the southeast, occurring on the 12th and 13th. Rain continued on the 14th, being heaviest in the north. The warm period was terminated by

High II, 30.3 inches, moving from the western to the central and eastern States, between the 6th and 16th, remaining on the central coast till the 19th, giving generally fair, cool weather with light frosts. The area passed southward on the 19th to 20th, while

Low III, 29.5 inches, moved over the lakes and down the St. Lawrence Valley, giving a brief warm wave and moderate rainfall, lightest in eastern New York.

High III, 30.1 inches, moved from the northwest to the eastern States on the 21st and 22d, giving a sharp depression of temperature and hard frosts on the 22d, afterward disappearing over the Atlantic.

Low IV, 29.4 inches, over the Upper Lakes on the 23d, thence passing over and north of New York and New England on the two days following. Normal temperatures and showers, which were heavy in the south and east, occurred on the 24th and 25th.

High IV, 30.4 inches, passing from the central States to the northeast on the 25th to 26th, brought fair and cool weather with frosts.

Low V, 29.6 inches, extended from Texas to the lakes on the 27th, contracting and remaining over the northeastern States and Canada until the end of the month, the weather continuing cool and partly cloudy, with scattering showers.

FARMING NOTES.—Vegetation, which was at about the usual stage at the opening of the month, advanced rapidly during the warm weather of the 1st and 2d, at which time fruit trees came into full bloom in warm central and southern localities. The temperature fell 5 to 10 degrees below freezing on and about the 8th, but little damage was sustained from frost. Cloudy weather and general rains between the 9th and 13th were beneficial to grass and grain, which were generally reported as being in fine condition, although meadows were rather poor in the north. The cool and cloudy or showery weather of the last 10 days seriously retarded the growth of small fruits and garden truck, and in some cases corn, potatoes, peas, etc., failed to sprout or rotted in the ground. Grass and grains, however, generally made a fine growth. Strawberries were exceptionally fine in the warmer and less rainy portions of the southeastern counties.

Injurious insects, especially the "tent caterpillar," were unusually numerous this month.

Miscellaneous notes, as furnished by observers at the following stations: Humphrey, fruit and forest trees were budding on the 6th; Wedgewood, bobolinks arrived on the 3d; Brentwood, peach trees bloomed in warm places on the 1st, plums, cherries and pears on the 4th, and apples on the 9th; Appleton, cherries in bloom on the 8th, apples on the 15th, first oriole seen on the 9th.

New Lisbon, frost of the 8th hurt grass. South Canisteo, a noticeable discoloration of grain, clover and forest leaves from frost of 22d. Arcade and Alfred report that no killing frosts occurred. A freeze occurred at Watkins on the 8th.

North Hammond reports a cold, rainy month; Wappingers Falls, cool, numerous showers, luxuriant vegetation, enormous strawberry crop; Number Four, a cold, cloudy month and much wind.

An earthquake shock was generally felt at northern stations at about 10.15 p. m. on the 27th, and in a lesser degree at central stations. At Saranac Lake the oscillations were felt about one minute.

METEOROLOGICAL DATA

LOCATION OF STATIONS.		BAROMETER.						HUMIDITY		TEMPERA				
STATION	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Western Plateau</i>														
Alfred	Allegany	1795									51.6	54.2	84	23
Angelica	"	1340									52.0	52.5	78	9
Bolivar	"	1860										52.8	81	9
Friendship	"	1550										53.9	81	9
<i>Franklinville</i>														
Franklinville	Cattaraugus	1598										52.8	79	9
Humphrey	"	1950									53.2	53.6	79	9
Arkwright	Chautauqua	1260										53.0		
Jamestown	"	1324										54.4	77	9
Elmira	Chemung	863										58.6	84	23
<i>Avon</i>														
Avon	Livingston	585										54.7	83	23
Mt. Morris	"	525												
Lockport	Niagara	650									55.8	57.0	79	a
Victor	Ontario													
<i>Wedgewood</i>														
Wedgewood	Schuyler	1350									53.0	54.8	83	9
Addison	Steuben	1000							66	43	54.1	55.5	80	9
South Canisteo	"	1480							73	45	52.5	53.5	82	9
Arcade	Wyoming	1707									51.8	52.2	78	9
<i>Eastern Plateau</i>														
Binghamton (1)	Broome	870									55.2	55.5	82	9
Binghamton (2)	"	875										55.0	81	9
Oxford	Chenango											55.0	80	20
Cortland	Cortland	1120										54.1	79	9
South Kortright	Delaware	1700										53.6	79	b
<i>Brookfield</i>														
Brookfield	Madison	1350												
Middletown	Orange	700									57.7	58.0	75	c
Port Jervis	"	470										58.2	83	10
Cooperstown	Otsego	1250									53.5	53.6	78	20
Garrattsville	"										54.2	52.6	78	20
New Lisbon	"	1234									50.8	52.0	79	9
<i>Oneonta</i>														
Oneonta	Otsego	1106									53.6	56.2	85	9
Perry City	Schuyler	1038									53.0	54.2	80	9
Straits Corners	Tioga											54.4	80	9
Waverly	"	824									56.8	56.0	84	9
Dryden	Tompkins	1079										54.0	80	9
Mohawk Lake	Ulster	1245									56.0	56.8	77	10
<i>Northern Plateau</i>														
Elizabethtown	Essex											52.1	82	20
Saranac Lake	Franklin											52.9	78	b
Gloversville	Fulton	850									54.8	54.8	82	20
<i>Little Falls (2a)</i>														
Little Falls (2a)	Herkimer	1526										50.0	79	20
North Lake	"											51.6	78	1
Lowville	Lewis	900										53.2	76	d
Number Four	"	1571	29.97	30.30	8	29.71	2	0.59	77	43		50.2	75	20
<i>Atlantic Coast</i>														
Brooklyn	Kings	70										58.7	86	10
Manhattan Beach	"											61.0	75	e
New York city	New York	314	29.96	30.37	8	29.67	2	0.70	70			56.4	74	11
Wilets Point	Queens											59.0	79	10
Brentwood	Suffolk	80										59.4	83	10
<i>Setauket</i>														
Setauket	Suffolk	40							71	49	57.7	58.6	81	10
Bedford	Westchester	290										57.9	83	10
Primrose	"	200										58.9	86	10

FOR MAY, 1897.

TEMPERATURE—(IN DEGREES FAHR.).										SKY.			PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	Duration.	Date.	Total snowfall.			
25	8	50	23	49	9	6	ag	9 0	11.9	10.1	12 8	3.41	1.33	<i>h. m.</i>	12	.....	S. W.	
29	8	49	21	35	8	11	2	5	13	13	15	3.35	0.60	.....	12	.....	S. W.
27	8	52	22	40	9	8	29	8	14	9	13	4.07	0.85	.....	12	.....	S. W.
25	8	56	28	49	9	7	12	5	14	12	11	2.80	0.75	.....	10	.....	W.
27	8	54	27	45	32	8	25	9	15	7	13	2.65	0.57	.....	12	.....	N. W.
28	8	51	24	40	8	10	3	9	10	12	14	3.40	1.20	12 00	12	.....	W.	
30	22	49	21	36	22	10	ah	4	12	15	14	3.84	1.33	.....	12	.....	S. W.
34	22	43	19	34	8	6	12	2	24	5	14	3.45	0.68	16.00	9-10	.....	N. W.	
33	8	51	21	36	9	6	10	16	0	15	13	5.56	0.99	.....	2	.....	W.
30	22	53	24	43	23	11	2	6	16	9	10	1.75	0.47	.....	4	.....	W.
35	22	44	24	44	22	12	4	11	12	8	9	2.30	0.57	10.00	5	.....	W.	
33	8	50	22	38	19	8	2	8	19	4	15	3.72	0.64	.....	10	.....	S. W.
30	8	50	24	43	9	11	2	14	9	8	17	4.26	1.25	20.00	4	.....	N. W.	
26	8	56	27	44	9	7	10	4	0	17	12	3.18	0.65	.....	2	.....	W.
30	j	48	21	35	9	10	25	9	12	10	14	4.30	0.80	.....	10	.....	W.
23	8	50	23	52	9	4	2	10.5	11.5	9.0	12 0	4.76	2.24	.....	13	.....	S. W.
30	8	52	21	42	9	8	4	5	16	10	12	4.88	0.86	23.00	25	.....	N. W.	
32	8	49	20	42	9	7	1	7	13	11	14	4.01	0.99	.....	24	.....	W.
26	8	54	28	47	9	14	29	6	13	12	11	5.47	1.18	.....	25	.....	N.
27	8	52	22	43	9	7	4	19	8	4	13	4.23	0.89	.....	3	.....	N.
24	8	55	28	49	9	7	4	.....	.....	.....	8	5.33	2.24	.....	13	.....	N. W.
39	8	36	20	27	ab	5	2	13	15	3	9	2.92	.....	.....	.....	.....	S. W.
34	8	49	25	40	9	5	2	12	12	7	10	5.57	2.22	.....	2	.....	N.
33	22	45	18	40	9	4	2	8	15	8	12	5.21	1.27	.....	25	.....	W.
30	j	48	21	43	9	7	2	11	4	16	8	7.30	1.38	6.00	14	.....	N.	
23	8	56	26	50	9	8	29	10	9	12	12	4.40	0.89	.....	24	.....	N.
29	8	56	26	52	9	11	29	.....	.....	.....	12	7.42	1.49	.....	13	.....	S. W.
26	8	54	25	44	9	11	2	10	11	10	14	3.69	0.53	5 05	10	.....	N.	
27	8	53	23	45	9	8	13	18	2	11	13	4.27	0.68	14 00	2	.....	W.	
27	8	57	25	49	9	7	2	9	13	9	16	3.66	0.74	18 00	13	.....	S.	
26	8	54	24	44	9	9	2	9	18	4	16	3.96	0.70	.....	2	.....	S. E.
40	8	37	16	25	22	4	2	.....	.....	.....	.....	3.92	.....	.....	.....	.....	.....
23	7	52	22	44	9	6	bb	10.2	9.3	11.5	13.3	4.34	1.20	.....	25	.....	W.
23	7	55	24	41	18	7	29	10	13	8	13	3.41	0.73	.....	25	.....	S. W.
29	8	53	23	44	9	6	13	11	4	16	15	5.18	0.97	.....	25	.....	W.
25	7	54	24	39	18	6	31	14	3	14	16	5.07	0.66	.....	23	.....	N. E.
27	8	51	21	32	26	9	2	14	11	6	11	4.41	0.62	.....	29	.....	W.
28	8	48	20	43	9	9	12	6	16	9	15	3.97	0.82	.....	25	.....	W.
26	8	49	22	42	9	9	29	6	9	16	10	3.99	1.20	.....	25	.....	W.
34	8	40	17	36	ae	5	bc	8.8	13.7	8.5	11.9	6.24	4.72	.....	12-13	.....	S.
46	21	29	15	28	10	6	2	7	14	10	11	6.90	2.15	.....	13	.....	S. W.
40	30	34	13	25	30	5	bd	6	15	10	12	4.23	1.18	.....	31	.....	N. W.
44	8	35	15	23	ad	7	be	10	13	8	11	5.30	1.80	.....	13	.....	N. W.
44	k	39	18	33	10	5	2	.....	.....	.....	11	5.90	1.70	.....	12	.....	N. W.
41	5	40	17	28	18	6	2	9	13	9	11	5.38	2.12	17.24	30-31	.....	S.	
35	8	48	20	35	5	7	13	13	10	8	14	9.83	4.72	.....	12-13	.....	W.
34	8	52	23	36	ae	8	3	8	17	6	13	6.18	1.95	.....	13	.....	S. E.

METEOROLOGICAL DATA

LOCATION OF STATIONS		BAROMETER.					HUMIDITY		TEMPERA					
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Hudson Valley</i>.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59.0	87	11
Albany.....	Albany.....	97	29.97	30.42	8	29.65	21	0.77	67	46	.....	59.0	77	9
Honeymead Brook.....	Dutchess.....	450	.....	.....	.....	.....	.....	.....	.....	.....	56.9	56.7	83	10
Poughkeepsie.....	".....	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	57.8	83	10
Wappingers Falls.....	Dutchess.....	110	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.1	84	10
Catskill.....	Greene.....	450	.....	.....	.....	.....	.....	.....	.....	.....	58.6	58.8	79	10
West Point.....	Orange.....	167	.....	.....	.....	.....	.....	.....	.....	.....	.....	60.6	87	11
Carmel.....	Putnam.....	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	59.1	84	10
<i>Mohawk Valley</i>.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.6	83	20
Little Falls (la).....	Herkimer.....	924	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.2	78	21
Canaajoharie.....	Montgomery.....	300	.....	.....	.....	.....	.....	.....	.....	.....	56.4	57.6	81	20
St. Johnsville.....	".....	810	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.7	79	20
Rome.....	Oneida.....	445	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.8	83	20
<i>Champlain Valley</i>.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.4	82	9
Plattsburgh Barr'ks.....	Clinton.....	125	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.7	75	12
Glens Falls.....	Warren.....	340	.....	.....	.....	.....	.....	.....	.....	.....	56.2	56.9	82	9
Lake George.....	".....	350	.....	.....	.....	.....	.....	.....	65	44	55.3	55.5	76	18
<i>St. Lawrence Valley</i>.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.8	79	23
Madison Barracks.....	Jefferson.....	266	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Watertown.....	".....	486	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canton.....	St. Lawrence.....	304	.....	.....	.....	.....	.....	.....	.....	.....	53.6	54.4	79	23
North Hammond.....	St. Lawrence.....	300	.....	.....	.....	.....	.....	.....	.....	.....	54.4	55.0	72	9
Ogdensburg.....	".....	258	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.2	75	14
Potsdam.....	".....	300	.....	.....	.....	.....	.....	.....	.....	.....	53.4	54.6	77	23
<i>Great Lakes</i>.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.7	82	23
Westfield.....	Chautauqua.....	758	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.2	79	9
Buffalo.....	Erie.....	768	29.06	30.40	8	29.51	2	0.89	70	43	.....	54.0	75	11
Pittsford.....	Monroe.....	502	.....	.....	.....	.....	.....	.....	.....	.....	54.2	54.4	82	23
Rochester.....	Monroe.....	523	29.06	30.40	8	29.61	20	0.79	67	43	.....	56.0	82	23
Appleton.....	Niagara.....	301	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.7	77	9
Fort Niagara.....	".....	263	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.8	75	9
Baldwinsville.....	Onondaga.....	390	.....	.....	.....	.....	.....	.....	.....	.....	55.7	56.8	80	9
Ridgeway.....	Orleans.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.2	75	20
Oswego.....	Oswego.....	335	29.94	30.40	8	29.58	23	0.82	72	43	.....	53.0	78	6
Palermo.....	Oswego.....	460	.....	.....	.....	.....	.....	.....	.....	.....	53.3	54.0	81	9
Lyons.....	Wayne.....	407	.....	.....	.....	.....	.....	.....	.....	.....	56.2	56.3	80	9
Erie, Pa.....	Erie.....	714	29.98	30.36	8	29.60	1	0.76	.....	.....	.....	54.0	79	9
<i>Central Lakes</i>.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.8	81	9
Fleming.....	Cayuga.....	1000	.....	.....	.....	.....	.....	.....	.....	.....	56.1	56.1	80	9
Romulus.....	Seneca.....	719	.....	.....	.....	.....	.....	.....	79	45	.....	56.0	81	9
Ithaca.....	Tompkins.....	810	29.95	30.39	8	29.55	2	0.84	69	46	55.2	55.3	80	9
Mean.....	.....	.....	29.86	30.42	8	29.51	2	0.77	70	45	.....	55.6	87	11

* Mean of the tri-daily observations. † Mean of the Max. and Min. by the Draper Thermo tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m.) ÷ 4. four hours. (1) Voluntary Observer. (2) U. S. Weather Bureau. (la) City Reservoir.

(a) 11, 20, 22; (b) 9, 20; (c) 11, 18, 20, 24; (d) 9, 23; (e) 18, 28; (f) 6, 19; (h) 9, 10, 23; (j) 8, 22; 21; (af) 2, 8; (ag) 10, 12; (ah) 12, 29; (bb) 13, 31; (bc) 2, 24, 31; (bd) 21, 31; (be) 2, 13; (bf) 26, 28,

FOR MAY, 1897—(Concluded).

TEMPERATURE — (IN DEGREES, FAHR.).							SKY.		PRECIPITATION — (INCHES).					Prevailing direction of wind.				
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.		† Duration.	Date.	Total snowfall.	
30	8	46	22	41	9	4	2	8	3	11.7	11.0	13.7	4.70	3.30	<i>h. m.</i>	13	-----	
38	8	39	19	34	9	8	2	11	8	12	16	4.69	1.80	-----	13	-----	S.	
32	8	51	23	39	9	12	13	6	10	15	12	4.44	1.81	-----	13	-----	S. W.	
30	8	47	25	41	9	9	2	4	16	11	12	3.36	1.45	-----	13	-----	N.	
34	8	50	25	49	8	6	29	8	15	8	16	3.92	1.16	15.00	13	-----	N.	
37	8	42	18	28	18	4	2	4	19	8	12	5.81	3.30	-----	13	-----	N. W.	
38	8	49	22	37	11	4	2	-----	-----	-----	14	4.70	0.90	10.00	14	-----	N.	
28	26	46	22	30	5	5	1	17	2	12	14	5.96	1.88	17.00	13	-----	S. W.	
30	8	49	22	41	9	6	1	14.7	4	7	11.6	4.18	0.83	-----	13	-----	-----	
31	7	47	19	28	<i>ae</i>	7	14	14	4	13	13	4.39	0.65	-----	24	-----	W.	
32	22	49	20	34	11	8	1	16	6	9	10	3.82	0.80	-----	25	-----	W.	
30	8	49	24	41	9	6	1	14	4	13	16	4.38	0.83	-----	13	-----	W.	
21	7	52	25	33	20	9	1	-----	-----	-----	14	4.12	0.51	-----	3	-----	-----	
29	8	47	21	44	9	5	13	8	5	7.5	15.0	14.7	3.91	1.33	-----	12-13	-----	
33	8	42	20	37	15	9	<i>bf</i>	6	6	19	12	3.41	0.80	-----	26	-----	S.	
30	8	52	23	44	9	11	<i>bg</i>	6	6	19	16	3.81	1.33	-----	12-13	-----	S. W.	
29	8	47	21	35	18	5	13	11	9	11	16	4.52	1.01	10.40	13	-----	S.	
28	<i>m</i>	44	22	39	8	4	2	7.8	9	5	13.7	10.8	3.51	1.58	-----	4	-----	
28	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	3.99	1.58	-----	4	-----	S. W.	
28	8	51	24	36	23	11	12	9	10	12	11	3.49	0.64	-----	25	-----	S. W.	
32	<i>n</i>	40	20	34	19	4	2	0	10	21	15	3.91	0.65	9.45	12	-----	W.	
26	8	39	19	30	26	7	<i>ce</i>	10	9	12	12	2.86	0.49	7.00	12	-----	S. W.	
31	8	46	24	39	8	10	29	12	9	10	9	3.30	0.78	-----	3	-----	S. W.	
27	8	43	19	43	9	3	7	10.4	10.6	10	1	11.9	2.56	1.08	-----	5	-----	
37	<i>aa</i>	42	20	30	10	10	<i>cd</i>	19	2	10	6	3.48	0.92	-----	4	-----	N. W.	
41	3	24	14	24	<i>af</i>	4	18	6	16	9	13	2.62	0.54	-----	4	-----	W.	
32	<i>j</i>	50	20	38	9	5	10	9	9	13	12	2.10	0.60	-----	12	-----	N. W.	
36	8	46	20	33	9	7	4	9	10	12	13	1.33	0.44	-----	4	-----	S. W.	
34	<i>j</i>	43	21	39	9	10	4	9	13	9	14	2.46	0.45	-----	4	-----	W.	
38	<i>j</i>	37	20	35	9	11	12	-----	-----	-----	8	3.07	1.08	-----	5	-----	S. W.	
35	8	45	20	40	9	9	<i>ce</i>	12	6	13	10	2.22	0.35	-----	3	-----	-----	
36	<i>j</i>	39	19	34	23	8	4	10	19	2	12	2.77	0.86	-----	12	-----	W.	
37	8	41	16	35	9	6	2	8	7	16	13	2.76	0.55	-----	14	-----	W.	
27	8	54	21	43	9	10	<i>ef</i>	15	7	9	15	2.99	0.69	-----	12	-----	S. W.	
35	8	45	18	36	9	7	4	6	20	5	14	1.84	0.33	-----	14	-----	N. W.	
40	22	39	14	25	9	3	7	12	8	11	13	3.04	0.63	-----	10	-----	W.	
32	8	48	19	38	20	6	4	8.0	13.7	9.3	9.3	3.60	1.14	-----	12	-----	-----	
34	8	46	17	32	9	6	4	3	22	6	5	2.17	0.71	22.00	3-4	-----	N. W.	
32	8	49	22	34	20	7	4	10	11	10	10	4.80	1.14	-----	12	-----	S.	
32	8	48	19	35	9	6	4	11	8	12	13	3.84	0.66	5.10	10	-----	N. W.	
23	<i>n</i>	47	21	52	9	3	7	9	6	10.4	11.0	12.4	4.12	4.72	-----	12-13	-----	W.

graph. || Report received too late to be used in computing means. The means from the † Blank indicates that the duration is not shown in the original records, but is within twenty- (2a) Intake Conduit, nine miles north of city.

(k) 5, 7; (m) 8, 15; (n) 7, 8; (aa) 22, 26, 27, 31; (ab) 9, 18, 23, 24; (ac) 8, 28; (ad) 21, 22; (ae) 10, 19, 29; (bg) 12, 13, 25; (ce) 13, 30; (cd) 3, 24; (cf) 4, 12; (ef) 12, 25.

TEMPERATURE — MAY, 1897. SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	61	56	50	48	54	55	50	49	60	59	59	62	58	56
Alfred	66	58	56	50	63	66	57	64	78	64	72	66	64	65
Angelica	53	46	40	39	42	44	38	29	46	50	45	52	46	43
.....	68	61	55	51	64	65	61	64	79	65	75	68	69	59
Bolivar	51	49	43	41	43	45	37	27	39	55	38	57	52	45
.....	71	63	59	53	65	70	61	69	81	69	72	63	68	64
Friendship	54	45	40	39	41	39	41	25	32	49	36	56	43	38
.....	72	64	59	54	69	69	60	64	81	70	77	70	69	68
Franklinville	56	46	41	41	43	42	38	27	38	45	40	54	46	40
.....	70	67	51	51	65	69	60	68	79	73	75	66	66	65
.....	55	47	41	40	43	44	42	28	43	52	40	51	41	42
Humphrey	68	61	60	50	65	73	64	68	79	65	73	63	65	64
.....	52	43	38	39	42	47	41	36	46	52	46	53	51	45
Arkwright .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jamestown	70	60	54	54	63	68	60	70	77	66	75	62	66	65
.....	56	45	39	41	45	48	46	36	44	56	46	56	52	46
Elmira	70	66	65	60	68	67	60	67	79	64	77	75	62	72
.....	45	53	45	48	51	43	44	33	43	58	44	63	53	52
Avon	73	67	58	57	66	59	59	66	68	69	71	73	62	70
.....	53	56	43	45	43	42	40	37	42	45	50	53	48	43
Lockport	68	76	65	58	67	64	58	69	78	70	79	73	76	63
.....	47	56	45	46	42	42	42	37	46	56	47	51	47	46
Wedgewood	67	58	64	54	62	62	55	66	83	62	74	69	63	68
.....	52	50	42	41	42	42	35	33	46	50	46	66	52	46
Addison	72	63	62	58	65	68	60	63	80	68	76	72	65	69
.....	58	52	44	44	43	44	40	30	37	52	40	59	51	49
South Canisteo	69	61	62	55	66	68	61	65	82	65	76	70	68	72
.....	54	49	40	40	43	40	35	26	38	58	40	55	46	43
Arcade	71	62	52	52	61	66	56	64	78	63	74	67	66	65
.....	55	42	41	40	43	45	39	30	43	50	44	53	46	41
<i>Eastern Plateau...</i>	60	55	54	49	51	55	50	46	58	61	58	63	59	61
Binghamton (1).....	65	63	61	53	68	62	60	56	82	72	75	72	69	74
.....	55	53	46	45	42	44	42	30	40	48	43	58	55	53
Binghamton (2).....	62	63	61	53	66	67	58	64	81	71	75	71	62	72
.....	55	53	47	45	42	45	40	32	39	47	42	59	54	50
Oxford	68	64	65	60	67	68	62	65	79	73	75	70	74	75
.....	53	48	45	43	38	37	39	26	32	50	37	53	56	51
Cortland	70	60	59	50	66	64	56	63	79	77	70	68	64	72
.....	57	51	49	43	41	40	43	27	36	52	36	56	52	51
South Kortright....	76	60	63	51	66	68	59	64	79	73	76	77	66	72
.....	46	46	45	44	37	37	38	24	30	50	36	54	50	41
Middletown	68	55	60	56	68	71	66	65	72	68	75	70	68	70
.....	47	50	48	45	45	51	45	39	45	55	49	55	56	52
Port Jervis.....	62	55	62	57	69	77	68	72	78	83	79	71	68	73
.....	53	59	49	46	44	47	47	34	38	57	45	58	58	53
Cooperstown.....	61	54	59	52	60	63	53	56	77	62	72	64	61	74
.....	55	50	49	44	42	45	45	34	37	50	42	55	50	50
Garrattsville	62	55	61	54	64	65	37	58	75	69	71	65	60	72
.....	51	48	45	43	38	42	48	30	32	46	37	56	52	49
New Lisbon.....	62	62	60	55	66	65	58	61	79	71	72	67	61	72
.....	52	50	43	42	33	36	35	23	29	44	36	50	49	40
Oneonta	65	62	67	58	74	71	64	66	85	73	78	71	65	76
.....	53	49	45	45	42	40	41	29	33	50	40	54	50	48
Perry City	68	65	61	55	68	62	56	62	80	67	77	78	65	64
.....	56	54	43	43	38	41	34	26	36	46	40	58	50	45
Straits Corners	65	61	63	53	67	63	51	65	80	67	72	70	61	71
.....	55	52	43	43	41	52	37	27	35	47	47	46	53	48
Waverly	69	61	62	56	68	72	64	67	84	70	75	69	64	72
.....	56	54	44	44	42	43	39	27	35	55	42	59	55	50
Dryden	68	63	64	54	64	62	56	61	80	73	75	72	63	74
.....	57	54	45	44	42	40	35	26	36	48	39	58	53	47
Mohonk Lake	62	52	55	53	62	65	62	58	70	77	73	67	64	66
.....	49	48	46	42	44	52	43	40	50	56	59	56	59	53

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
52	50	51	59	57	64	52	49	61	58	49	47	49	51	49	56	52	54.1
57	60	64	70	70	74	62	64	77	63	53	58	61	62	52	66	59	52.5
43	35	36	46	38	56	38	32	47	49	42	33	36	37	39	42	40	
56	60	65	76	65	70	58	61	69	66	51	57	62	67	53	65	61	52.5
40	35	32	45	42	50	37	28	40	51	40	30	30	41	45	33	29	
60	62	66	73	74	73	65	66	80	65	60	59	64	69	56	69	68	52.8
42	35	30	40	38	43	40	28	38	47	42	29	28	30	39	43	40	
65	64	67	73	75	78	67	74	79	67	52	62	65	66	52	71	64	53.9
44	36	33	44	40	53	34	29	41	47	44	31	31	35	40	41	38	
57	62	65	69	72	75	64	64	77	63	57	60	63	62	54	66	61	52.8
43	32	34	46	40	46	41	29	40	48	42	33	31	33	39	39	35	
58	65	65	69	73	74	54	66	74	63	51	62	62	62	48	64	56	53.6
42	38	39	47	45	56	40	30	52	49	41	36	36	40	38	42	37	
58	64	64	69	73	74	59	66	76	62	58	58	62	60	48	67	58	53.0
44	36	38	50	50	56	43	34	52	50	44	36	36	40	41	40	29	54.4
63	71	68	77	73	79	74	68	84	76	59	62	65	65	64	70	76	
52	55	45	44	45	54	47	37	53	55	45	49	38	44	46	55	46	58.6
64	64	68	73	69	80	65	63	83	68	63	62	65	68	59	71	60	
42	33	34	51	36	53	39	30	40	50	45	33	31	37	42	43	41	54.7
68	70	72	74	74	79	56	79	76	70	58	65	68	65	67	76	61	57.0
41	41	45	50	43	46	41	35	47	49	44	39	43	43	46	46	41	
62	62	70	74	78	75	66	68	74	71	51	60	65	61	64	68	68	54.8
44	40	39	46	40	54	40	34	47	51	39	37	40	43	41	41	45	
65	64	67	74	72	77	70	67	76	71	56	61	64	65	59	71	68	55.5
46	39	35	41	42	44	45	32	42	50	43	37	34	37	44	47	48	
60	65	68	75	74	78	64	65	81	72	53	60	62	68	55	70	64	
44	33	31	39	36	49	39	28	40	46	39	29	30	36	39	40	37	53.5
57	60	64	68	71	74	57	60	76	63	50	57	60	60	51	67	56	
42	32	36	49	42	55	40	30	45	46	40	34	34	41	38	41	36	52.2
52	50	52	56	55	61	56	49	59	62	51	50	49	55	51	56	58	55.0
60	64	68	65	70	77	70	64	72	72	55	60	61	63	57	69	68	55.5
46	37	35	40	43	53	43	34	54	55	45	42	35	43	45	44	46	
59	61	67	74	70	77	69	62	72	72	54	57	61	64	56	69	65	55.0
44	37	36	41	46	55	41	34	47	54	44	43	37	45	46	46	46	
64	65	72	73	70	80	72	65	75	76	60	60	68	72	57	70	72	
42	33	31	35	35	45	43	32	38	51	42	38	32	41	43	39	50	55.0
64	58	63	69	73	77	75	62	75	70	58	58	61	60	54	66	66	
46	34	33	40	36	54	43	33	44	45	42	38	33	40	42	42	49	54.1
64	68	68	72	68	79	68	63	75	75	60	60	60	67	54	72	67	
42	30	31	33	35	45	39	29	35	52	42	38	29	42	42	43	50	53.6
65	65	70	75	72	75	72	66	73	75	65	63	61	70	64	69	74	58.0
49	43	45	48	52	52	48	41	46	48	49	45	43	51	53	45	55	
69	69	71	76	76	78	73	70	76	77	67	64	68	71	64	71	74	58.2
47	49	41	40	49	47	49	37	39	59	55	46	41	50	53	43	56	
53	60	65	70	61	78	66	58	74	73	55	56	55	64	52	67	63	53.6
44	35	40	40	41	52	42	33	42	55	44	42	36	50	45	47	40	
50	62	64	70	63	78	65	57	71	70	54	57	58	69	50	64	66	52.6
40	34	36	35	37	51	40	30	41	52	42	40	35	44	42	45	44	
58	63	67	71	66	77	68	61	76	71	55	58	59	68	51	65	65	52.0
38	29	29	32	34	45	40	30	37	52	41	38	20	41	43	44	42	
67	68	70	76	72	80	70	67	76	77	61	64	62	68	55	72	70	56.2
45	33	35	40	48	48	43	33	38	52	44	41	34	47	44	46	47	
62	66	70	74	69	76	69	69	76	67	52	60	65	61	60	70	65	54.2
45	33	32	39	48	51	37	30	48	48	39	35	35	41	41	39	45	
62	64	73	75	68	77	68	65	73	74	55	60	64	65	57	65	70	54.4
44	36	33	35	40	49	42	33	43	51	42	37	35	42	44	40	40	
62	66	72	76	72	77	74	69	75	74	58	64	67	67	62	69	70	56.0
44	36	33	39	42	50	43	31	43	50	43	38	32	38	48	41	52	
59	60	67	73	69	79	71	62	75	74	53	57	60	63	58	68	63	54.0
46	33	32	39	35	57	39	30	45	52	42	36	31	40	44	41	43	
62	62	65	71	65	71	67	67	69	70	65	61	64	66	62	64	69	56.8
49	46	48	54	52	51	45	42	50	55	45	45	44	46	45	48	50	

TEMPERATURE -- MAY, 1897, SHOWING DAILY MEANS FOR
STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau.</i>	58	56	54	49	53	52	44	45	59	57	58	58	54	57
Saranac Lake.....	66	61	67	59	72	64	55	61	78	67	76	61	63	72
	52	45	45	32	40	27	23	39	54	39	54	50	42	42
Gloversville.....	62	58	60	58	71	68	66	62	78	73	74	67	61	73
	53	50	48	15	37	43	38	29	34	51	46	41	55	47
Little Falls (2a)....	60	59	63	57	71	69	60	63	77	67	72	66	58	73
	50	48	45	33	39	34	25	30	54	37	47	52	44	45
North Lake.....	78	60	59	61	51	68	63	53	70	74	60	68	63	55
	50	51	47	43	35	41	35	27	43	45	36	51	49	45
Lowville.....	63	68	63	56	67	69	53	60	76	67	73	65	65	71
	53	54	48	43	49	49	34	28	33	56	46	56	47	48
Number Four.....	62	62	61	54	68	60	51	58	74	63	70	61	59	70
	42	52	42	44	34	41	31	26	32	41	36	51	46	48
<i>Atlantic Coast.</i>	54	51	52	53	54	60	57	53	59	67	62	61	59	61
Brooklyn.....	65	58	63	65	66	73	67	68	70	81	73	68	62	67
	52	52	47	48	55	53	49	48	60	53	55	57	55	54
Manhattan Beach..	62	53	55	58	54	62	72	62	62	65	74	65	58	60
	59	46	46	46	46	48	50	42	46	50	54	52	51	54
New York City.....	60	57	57	61	64	74	67	63	69	79	71	70	64	68
	59	50	48	45	49	54	50	44	47	57	54	55	57	54
Willet's Point.....	60	53	54	61	63	63	65	67	75	83	75	69	63	68
	47	48	45	45	44	45	44	45	52	50	55	56	54	54
<i>Long Island Sound.</i>	62	58	63	61	67	76	68	68	69	78	74	64	63	72
Brentwood.....	40	48	45	43	36	48	39	40	44	53	43	55	56	51
	59	52	54	61	65	71	64	62	70	81	73	67	65	70
Setauket.....	47	46	47	44	41	50	45	44	44	55	50	56	56	52
	58	54	58	61	71	73	68	66	74	83	76	69	63	70
Bedford.....	47	47	46	45	36	59	44	35	43	57	45	52	56	50
	55	44	58	63	65	74	67	66	76	86	76	72	66	72
Primrose.....	45	45	50	46	43	49	46	34	40	52	47	56	54	52
<i>Hudson Valley.</i>	58	54	56	55	55	60	55	50	58	63	63	64	62	61
Albany.....	65	61	63	61	74	68	63	62	77	75	76	71	66	74
	51	52	51	49	44	51	44	38	43	54	48	58	55	54
Honeynead Brook..	66	58	63	63	67	66	63	58	76	83	77	73	66	74
	51	38	47	42	39	51	44	32	37	54	42	55	54	49
Poughkeepsie.....	65	59	62	62	70	71	67	63	77	83	77	73	67	74
	50	50	48	45	41	51	43	30	36	50	41	55	53	48
<i>Adirondack.</i>	67	68	77	63	72	71	68	74	78	84	79	76	70	74
Wappingers Falls..	52	51	50	46	42	52	42	34	42	60	48	56	58	50
	64	56	63	60	71	67	64	60	76	79	72	70	65	71
Catskill.....	54	52	51	51	45	52	46	37	40	55	48	56	56	54
	75	56	55	59	60	69	74	68	65	80	87	78	73	65
West Point.....	52	52	49	46	43	56	44	38	41	60	50	55	60	45
	55	55	60	66	69	72	65	61	75	84	80	71	68	75
Carmel.....	50	47	49	47	39	55	44	42	49	60	54	56	51	49
<i>Champlain Valley.</i>	56	55	56	50	55	55	48	49	56	58	61	63	59	59
Little Falls (1a)....	59	57	62	55	67	65	56	60	64	72	75	72	70	57
	48	49	44	40	41	42	31	39	45	44	56	57	57	50
Canajoharie.....	62	68	61	59	70	70	62	64	65	72	76	70	66	77
	54	50	50	48	52	47	45	34	38	52	42	56	54	50
St. Johnsville.....	69	58	63	56	67	67	59	62	75	71	71	64	63	74
	54	50	50	46	38	42	40	30	34	49	42	55	56	47
Rome.....	58	63	68	60	64	69	60	67	75	65	74	70	60	75
	49	47	44	39	42	41	31	36	56	40	51	53	44	45
<i>Champlain Valley.</i>	54	56	55	53	55	55	48	45	55	61	60	61	56	59
Plattsburgh Bar'ks.	61	65	57	60	64	68	57	54	61	68	71	75	63	64
	43	46	46	42	41	42	35	33	40	48	48	48	47	38
Glens Falls.....	63	63	66	66	74	65	59	63	82	74	76	66	63	75
	50	50	49	47	41	47	39	30	38	53	41	55	52	50
Lake George.....	69	59	62	57	73	63	59	60	72	73	74	66	57	72
	45	50	48	46	39	44	37	29	39	51	51	58	52	52

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
50	48	51	52	51	62	50	46	57	61	49	48	46	54	47	55	53	52.1
60	60	70	72	64	78	57	63	75	72	50	59	50	70	51	69	62	52.9
32	35	37	31	43	54	29	38	53	48	35	33	41	45	44	49	40	
62	65	63	73	66	82	63	63	74	74	59	62	58	67	52	68	65	54.8
47	35	41	38	39	45	44	37	36	53	48	42	35	45	45	48	49	
61	66	70	72	66	79	56	62	75	70	55	63	58	61	51	67	60	50.0
31	40	35	33	45	50	31	35	52	48	31	32	44	42	43	50	54	
70	55	59	63	68	60	75	50	57	73	67	67	56	54	63	50	61	51.6
41	33	37	35	36	41	45	32	36	54	47	35	33	40	40	40	48	
58	62	65	67	60	76	61	58	76	66	56	58	59	63	52	63	58	53.2
41	32	33	41	34	50	41	31	41	53	42	34	33	48	42	46	44	
54	61	65	67	59	75	58	57	74	65	52	55	55	64	49	60	57	50.2
39	31	33	34	32	51	39	26	37	52	41	32	31	40	40	45	42	
60	59	59	62	62	60	60	58	57	63	62	57	57	63	60	58	63	56.7
68	65	72	75	68	67	70	75	65	71	72	65	68	75	68	67	74	61.0
53	51	52	58	53	57	46	50	56	58	51	48	55	63	52	57	58	
57	65	64	68	67	68	61	66	65	57	60	69	63	68	69	65	59	
50	54	50	52	52	54	52	46	44	52	54	52	46	52	56	40	54	56.4
70	61	71	71	72	67	72	68	62	71	69	63	66	69	63	65	72	
53	53	52	53	56	54	49	45	52	56	51	50	47	55	54	50	58	59.0
69	73	75	77	74	69	70	70	65	71	72	61	68	75	65	70	75	
54	58	48	55	50	50	45	48	55	58	50	47	52	57	49	55	50	59.4
70	60	69	74	70	69	73	68	67	72	70	62	64	73	68	68	73	
55	52	46	46	54	49	53	47	49	57	57	49	49	53	56	48	56	58.6
68	66	72	74	76	70	68	70	67	71	70	61	61	72	64	67	71	
52	50	44	43	52	49	52	41	40	55	56	46	42	52	53	45	53	57.9
71	70	71	78	75	73	72	71	68	79	73	68	70	78	79	71	76	
53	50	44	44	52	46	50	40	41	56	59	41	42	42	53	45	51	58.9
59	58	58	60	59	63	61	54	58	64	60	56	53	62	59	60	63	59.0
65	68	72	77	70	76	65	67	73	76	60	62	58	73	60	72	70	
51	45	47	47	51	56	48	42	47	58	48	46	43	50	51	50	50	59.0
66	64	67	74	66	74	70	62	72	73	65	58	62	74	62	72	73	
47	45	43	41	50	50	42	42	40	56	50	45	40	42	47	40	53	56.7
68	67	71	77	71	75	72	67	74	76	69	62	66	78	67	74	76	
47	40	39	40	50	49	46	35	39	55	51	46	38	50	49	40	53	57.8
70	78	75	78	71	77	77	68	76	77	71	73	72	77	68	72	77	
50	45	43	45	35	50	54	40	42	48	58	58	42	50	62	48	56	61.1
67	67	67	74	66	75	66	65	72	74	64	64	61	74	64	70	69	
51	47	47	46	51	53	58	44	45	57	50	47	43	52	53	52	54	58.8
71	85	68	78	78	72	78	70	72	72	74	72	65	70	76	72	72	
56	50	46	45	54	51	58	44	43	52	57	49	46	52	54	49	55	60.6
71	69	71	75	74	75	70	67	73	75	70	60	67	76	66	75	76	
51	44	49	46	45	47	52	39	44	53	49	38	43	48	51	54	52	59.1
55	50	55	56	56	63	56	49	60	65	54	50	52	56	54	58	56	56.0
70	57	64	65	70	64	78	58	60	74	71	50	60	58	62	59	66	
46	34	40	42	42	46	50	24	41	55	48	38	37	46	43	43	51	54.2
63	67	64	74	65	81	68	64	77	77	62	64	62	67	57	70	63	
31	39	43	43	45	52	45	32	56	61	47	49	47	50	46	49	52	57.6
59	64	65	70	64	79	72	60	72	71	60	61	59	62	57	65	64	
46	35	43	49	43	48	42	36	40	55	48	40	38	47	45	49	46	54.7
65	68	72	72	67	83	62	70	76	76	58	64	68	72	73	75	66	
36	38	42	40	50	50	32	43	54	48	38	35	42	43	45	50	44	55.8
56	53	55	57	53	57	58	52	56	64	55	51	50	56	55	56	60	55.4
72	62	63	67	72	57	73	66	67	73	70	50	57	52	57	60	68	
35	47	43	45	39	41	43	39	41	53	49	41	42	43	48	46	55	53.7
68	60	71	74	63	76	66	68	76	78	58	64	58	74	62	69	71	
48	40	40	40	41	47	47	37	38	57	47	47	46	48	49	45	49	56.9
65	67	71	76	62	73	68	67	70	69	59	60	55	71	63	67	70	
48	42	44	41	40	48	48	37	39	55	47	41	40	46	50	47	45	55.5

TEMPERATURE—MAY, 1897, SHOWING DAILY MEANS FOR
STATIONS

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Valley</i>	57	66	55	56	57	54	48	48	55	60	58	60	58	61
Madison Barracks.	37	43	41	40	39	41	37	20	40	38	42	49	45	42
Watertown														
Canton	70	66	63	62	73	59	56	62	74	71	77	67	67	78
	45	50	47	45	40	44	35	28	41	51	45	56	49	48
North Hammond ..	70	60	62	60	68	72	62	62	66	66	70	66	66	68
	46	56	50	54	56	44	32	32	38	54	44	58	48	46
Ogdensburg	68	61	61	62	70	64	55	60	65	67	70	65	62	75
	46	48	48	48	42	40	38	36	42	50	45	55	55	50
Potsdam	67	68	65	69	68	71	63	70	73	72	70	66	64	72
	43	41	40	45	41	40	36	31	38	45	44	53	50	50
Great Lakes	61	54	49	48	52	53	48	48	61	60	62	63	58	57
Westfield	73	60	50	54	63	63	57	64	79	79	75	77	67	65
	45	40	40	40	45	48	42	40	50	49	51	52	49	48
Buffalo	72	65	50	56	63	65	67	67	73	61	75	63	66	61
	60	41	41	42	42	46	47	43	51	48	52	49	49	46
Pittsford	71	65	56	52	66	57	53	54	81	57	77	77	68	59
	53	45	44	45	40	45	41	32	43	52	46	56	50	47
Rochester	71	64	54	50	66	58	56	63	80	67	76	68	63	68
	58	45	44	43	40	47	44	36	47	52	49	57	53	49
Appleton	74	60	54	55	63	59	55	55	77	69	76	71	66	67
	46	44	43	45	39	45	42	34	38	55	45	56	46	45
Fort Niagara	74	65	56	56	65	63	56	55	75	72	74	68	65	64
	45	42	43	44	39	44	43	38	40	51	48	57	46	44
Baldwinsville	72	63	65	55	65	62	56	64	80	67	77	70	65	72
	56	52	46	46	43	45	40	35	40	53	49	61	54	49
Ridgeway	72	63	55	53	64	58	54	61	71	68	73	69	68	64
	43	46	44	45	41	46	42	36	43	57	44	56	48	47
Oswego	69	58	52	52	51	53	50	53	78	67	75	68	71	72
	56	52	42	40	37	44	41	37	43	48	48	59	50	50
Palermo	67	68	58	54	61	59	54	60	81	69	77	68	62	78
	56	55	45	43	37	43	40	27	38	57	43	58	49	47
Lyons	70	67	60	53	65	57	53	62	80	67	75	70	64	73
	60	55	46	46	41	45	40	35	44	55	46	60	55	50
Erie, Pennsylvania	65	43	49	50	58	64	52	60	79	64	73	65	66	62
	41	40	41	41	42	47	42	44	54	52	54	58	52	48
Central Lakes	63	60	54	48	53	52	48	48	63	61	60	63	59	61
Fleming	70	65	63	52	62	59	54	62	80	70	75	70	65	71
	58	54	45	46	41	44	43	34	48	55	48	59	55	51
Watkins														
Rosenthal	64	65	62	52	65	62	58	64	81	67	76	70	64	73
	58	55	44	45	42	41	39	32	45	53	47	53	55	50
Ithaca	68	64	62	51	63	60	54	62	80	68	74	69	62	71
	58	55	46	45	43	43	43	32	45	51	44	58	55	52
Mean	58	55	54	51	54	55	50	48	58	61	60	62	58	59

† Maximum and minimum by the Draper Thermograph. †† Received too late to be used in
(2a) Intake Conduit, nine miles north of city.

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
52	51	53	58	51	61	52	49	58	60	50	50	51	57	52	54	54	54.8
28	35	36	40	39	41	42	35	79	49	66	53	52	65	56	58	67	-----
64	61	67	73	64	77	61	63	79	68	53	64	63	69	60	63	61	54.4
41	34	38	44	33	49	38	31	43	51	41	33	38	43	46	46	46	55.0
62	66	68	70	72	64	60	62	66	66	52	66	68	68	66	60	56	55.2
44	40	28	48	38	50	46	38	38	54	44	38	38	48	48	48	48	54.6
58	61	62	70	57	74	67	61	70	65	65	68	64	67	59	64	64	54.7
45	40	43	48	40	50	41	39	45	51	42	38	45	47	47	57	48	55.2
60	69	70	68	71	73	61	62	77	67	53	69	65	70	57	59	61	54.4
44	38	37	39	35	47	41	35	44	53	42	37	39	45	47	46	47	54.7
57	51	55	60	55	64	52	49	62	57	50	50	53	53	51	57	50	55.2
57	59	66	68	72	76	63	62	79	62	62	59	64	65	55	69	57	54.0
45	38	43	54	50	60	43	37	53	52	45	37	37	41	44	46	37	54.4
56	60	58	55	69	68	53	56	66	58	56	60	58	55	52	67	51	56.0
46	45	50	51	48	52	43	44	52	46	44	44	46	45	44	47	43	54.4
61	61	67	71	65	78	63	54	82	64	55	60	64	60	60	69	60	56.0
43	38	43	52	41	55	44	32	48	52	43	36	41	45	43	46	42	53.7
58	62	66	71	67	77	61	64	82	65	57	61	67	60	58	70	58	54.8
43	40	44	51	46	58	41	36	50	48	44	39	42	46	44	47	43	54.8
62	62	62	69	60	77	61	63	68	63	60	64	68	63	60	71	54	56.8
44	38	41	50	41	43	44	34	46	50	44	38	41	42	44	46	41	54.2
62	63	66	70	61	73	63	63	65	64	60	63	70	70	62	68	61	53.0
43	41	44	54	43	42	43	38	49	51	44	43	46	45	44	48	40	54.0
63	64	70	74	67	80	65	65	78	71	58	62	65	64	61	69	64	54.2
44	41	41	49	43	53	44	39	53	55	46	39	42	48	46	46	48	54.0
61	63	67	70	61	75	60	63	72	65	58	62	66	61	59	69	56	56.3
41	40	44	53	44	46	45	36	38	52	45	38	43	45	44	47	43	54.0
55	56	64	64	57	78	63	59	77	63	53	56	56	56	52	65	53	54.0
42	41	44	50	44	56	42	40	59	52	42	42	42	43	43	46	44	56.3
60	62	69	69	64	78	60	63	78	64	53	61	63	60	55	66	58	54.0
42	35	46	44	41	43	43	35	45	51	43	33	35	43	43	43	45	56.3
61	62	67	73	65	78	64	64	78	70	54	60	63	61	59	67	62	54.0
47	42	42	51	43	57	46	40	50	53	45	40	43	49	46	47	47	54.0
56	58	62	66	71	76	52	58	75	58	51	57	60	62	52	67	54	54.0
45	42	45	54	54	54	45	40	51	49	45	42	43	46	44	47	40	55.8
53	51	54	61	54	64	56	52	62	62	49	48	51	53	52	58	56	56.1
60	60	67	73	65	78	65	58	68	70	57	58	61	63	57	66	65	56.1
44	42	41	51	44	58	48	45	55	54	43	40	42	41	44	46	48	56.0
62	65	71	74	67	77	67	69	80	73	55	61	66	62	59	67	65	56.0
46	39	38	50	38	39	44	41	48	54	44	37	40	49	44	44	47	55.3
60	61	67	73	65	77	73	62	74	72	53	58	61	62	56	67	62	55.3
48	39	38	44	42	57	42	35	49	53	43	40	37	43	45	44	48	55.3
55	52	54	58	55	62	55	51	59	62	53	51	51	56	53	57	56	55.0

computing means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir;

DAILY AND MONTHLY PRECIPITA

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i> ..	0.03	0.27	0.19	0.52	0.11	T.	T.	0.01	0.05	0.45	T.	0.50	0.09	0.17
Alfred .....	.12	.48	.26	.58	.....	.....	.....	.....	.37	.....	.60	.02	.11	.....
Angelica .....	.02	.52	.34	.22	.....	.....	.....	.....	.68	.60	T.	.85	.12	.....
Boliver .....	.....	.....	T.	.42	.07	.....	.....	.....	T.	.75	.....	.45	.02	.14
Friendship .....	.08	.28	.19	.40	.....	.....	.....	.....	.05	.45	T.	.57	.03	.15
Franklinville .....	.05	.20	.06	.56	.08	.....	.....	.....	T.	.05	.....	1.20	.02	.15
Humphrey .....	.04	.21	T.	.78	.....	.....	.....	.....	.13	.53	.....	1.33	.....	.13
Little Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherry Creek .....	.04	.15	.....	.53	.02	T.	.....	.....	.01	.70	.....	.53	.03	.17
Jamestown	T.	.45	.....	.63	.02	.....	.....	.....	.04	.61	.....	.55	.....	.27
Elmira .....	.....	.99	.59	.70	.....	.....	.....	.....	.12	.48	.....	.32	.70	.26
Pine City	T.	.18	.37	.84	.24	.....	.....	.....	.....	.61	.....	.29	.51	.29
Akron .....	.....	T.	T.	.35	.90	.....	T.	T.	.45	T.	T.	.26	T.	.26
Avon	T.	T.	.31	.47	.....	.....	.....	.08	T.	.06	.....	.....	.....	.32
Mt. Morris	T.	T.	.50	.50	.....	T.	.....	.....	.....	.30	.....	.60	T.	T.
Lockport .....	.18	.31	T.	T.	.57	.....	.....	.....	.....	.....	.....	.51	.....	.20
Victor .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tyrone .....	.....	.25	.....	.....	.15	.....	.....	.10	.....	.30	.....	.....	.....	.15
Wedgewood .....	.02	.25	.45	.40	.....	.....	.....	.....	.....	.64	.....	.30	.23	.17
Addison	T.	.30	.25	1.25	.03	.....	.....	.....	T.	.69	.....	.21	.22	.21
Atlanta .....	.....	.04	.14	.54	.20	.....	.....	.....	.....	.44	.....	.35	.....	.09
Haskinsville .....	.05	.25	.50	.30	.....	.....	.....	.....	.....	.45	T.	.50	T.	.10
South Canisteo	T.	.65	.03	.61	.....	.....	.....	.....	.15	.60	.....	.30	.07	.10
Arcade .....	.04	.21	.10	.76	.10	T.	.....	.....	.01	.80	.....	.76	T.	.20
Attica .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Eastern Plateau</i> ...	0.01	0.49	0.27	0.25	T.	0.00	T.	0.00	0.01	0.50	T.	0.36	0.94	0.31
Binghamton (1) .....	.....	.72	.18	.10	T.	.....	.04	.....	.....	.48	.....	.56	.68	.22
Binghamton (2)	T.	.49	.15	.04	.01	.....	.01	.....	T.	.45	.....	.40	.60	.28
Chemango Forks .....	.....	.10	.40	.....	.....	.....	.....	.....	.....	1.00	.....	.30	.70	.....
Oxford	T.	.67	.05	.....	.....	.....	.....	.....	.....	.75	.....	.31	.70	.23
Cortland	T.	.35	.89	.12	.....	.....	.....	.....	.....	.50	.....	.20	.51	.21
South Kortright .....	.....	.....	.....	1.01	.....	.....	.....	.....	.03	.52	.....	.18	2.24	.29
Brookfield .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middletown .....	.....	*	*	+1.35	.....	.....	.....	.....	.....	.30	.....	.....	*	+1.70
Port Jervis .....	.....	2.22	.17	.18	.....	.....	.....	.....	.....	.24	.....	.57	1.43	.33
Warwick .....	.10	.51	.04	.21	.....	.....	.....	.....	.....	.11	.....	.53	1.80	.11
Cooperstown .....	.07	.39	.19	.....	.....	.....	.....	.....	.....	.36	.....	.10	1.05	.34
Gairattsville	T.	.....	.20	.....	.....	.....	.....	.....	.....	1.02	.....	1.25	1.35	1.38
New Lisbon .....	.....	.09	.02	.64	.....	.....	.....	.....	.....	.35	.....	.17	.72	.35
Oneonta .....	.....	.....	.44	.76	.....	.....	.....	.....	.11	.67	.....	.71	1.49	.38
Perry City .....	.....	.29	.52	.13	.....	.....	.....	.....	.....	.53	.....	.44	.18	.24
Newark Valley .....	.....	.74	.30	.05	.....	.....	T.	.....	.....	.60	.....	.30	.60	.30
Straits Corners .....	.....	.68	.35	.40	.01	.....	.....	.....	.....	.59	.....	.18	.63	.41
Waverly .....	.03	.45	.50	.35	.....	.....	.....	.....	.01	.48	.....	.13	.74	.30
Dryden .....	.....	.70	.26	.13	.01	.....	.01	.....	.....	.60	T.	.20	.48	.16
Mohawk Lake	*	*	+1.00	.23	.....	.....	.....	.....	.....	.....	.....	*	+1.35	.....
<i>Northern Plateau</i> ...	0.01	0.07	0.13	0.36	0.13	0.00	0.00	0.00	0.01	0.20	T.	0.44	0.46	0.49
Elizabethtown .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saranac Lake .....	.....	.....	.14	.....	.....	.....	.....	.....	.06	.....	.....	.14	.21	.65
Gloversville	T.	.10	.07	.64	.....	.....	.....	.....	.....	.20	.....	.56	.77	.15
Little Falls (2a) .....	.04	.01	.39	.27	.....	.....	.....	.....	.01	.49	.....	.52	.65	.39
North Lake .....	.....	.....	.....	.56	.....	.....	.....	.....	.....	.20	.....	.55	.45	.48
Lowville .....	.....	.11	.03	.80	.....	.....	.....	.....	.....	.07	.....	.34	.....	.60
Number Four .....	.....	.....	.....	.....	.90	.....	.....	.....	.....	.07	T.	.....	.06	.88
Kings Station .....	.....	.30	.25	.25	.....	.....	.....	.....	.....	.40	.....	1.00	1.10	.25
<i>Atlantic Coast</i>	0.10	0.99	0.11	0.10	T.	0.00	0.02	0.00	T.	0.17	0.04	0.81	1.58	0.09
Brooklyn .....	.....	1.33	.....	.07	.....	.....	.....	.....	.....	.20	.....	.59	2.15	.....
Manhattan Beach	*	1.06	.34	.06	.....	.....	.....	.....	.....	T.	.08	.18	.76	.66
New York City	T.	.95	.05	T.	.....	.....	.....	.....	.....	.10	.....	.22	1.80	.....
Willet's Point .....	.20	.80	.10	.....	.....	.....	.....	.....	.....	.20	.19	1.70	.65	.....

TION FOR MAY, 1897 — (INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
0.01	T.	T.	T.	0.00	0.09	0.27	0.00	0.19	0.52	0.16	T.	T.	0.07	0.07	0.01	T.	3.31
T.		T.	T.		.01	.18		.34	.01	.11			.04	.12			3.35
T.		T.			.08	.56		.28	.22				.18				4.07
T.					T.	.28		.30	.23	.05			T.	.09			2.80
					.08	T.		.28	.08	T.			T.	.10	T.		2.65
T.		T.			.04	.78		.09	T.	T.			.04	.08	T.		3.40
		T.			.35	.03		.11	.04	.01			.12	.03			3.84
																	4.02
.08					.24	1.27		.11		T.			.10	.04		.02	4.02
	T.	T.			.30	.33		.07	.04	T.			.08	.01		.02	3.45
						.18		.45		.67				.06	.04		5.56
								.40	.12	.61			.07			.02	4.55
T.					*	†.39		.09	T.	T.	.06	T.	T.	.06	T.	T.	2.82
					T.	.10		.21	.07				.08	.05			1.75
					T.	.45		.10	.05	T.			.05	T.			2.55
.13					.23			.10	.07			T.		T.			2.30
														.10			1.05
					T.	.12		.28	.02	.62			.09	.10	.03		3.72
			.01		T.	.06		.21	.01	.48			.06	.14	.11	.02	4.26
						.28		.21	.11	.21			.09	.21			2.91
						.16		.25	T.	.20			.10	.20			3.06
T.		T.			.10			.02	T.	.35			.20	T.			3.18
			T.		.39	.70		T.	.01	T.			.18	.04	T.		4.30
0.01	T.	0.00	T.	0.00	0.04	0.10	T.	0.22	0.43	0.48	T.	0.00	0.07	0.07	0.02	0.03	4.63
T.					.15	T.			.85	.86			T.	.04			4.88
T.			T.		.11			.05	.99	.38			T.	.05			4.01
					.60											.50	3.60
					.15	.23		T.	1.08	1.18						.12	5.47
	.06					.20			.33	.41			.02	.43			4.23
								.38					.68				5.33
										.38			.05		.14		2.92
.18								.17	.21							.05	5.57
								.16	.20						.08	.10	4.13
					.42			.80	.05	1.27			.17				5.21
									.95	1.15							7.30
					.23				.89	.73			.02	.19			4.40
					.21			1.16	1.02	.27			.20				7.42
					.08			.31	.12	.46			.16	.20	.03		3.69
						.05		.15	.40	.46				.06			4.01
					T.	.13		.46	.18	.23			.02				4.27
					.01	.63		.34	.08	.16			.01	.04			3.66
.07						.10		.35	.13	.38	T.		.02	.36	T.		3.06
									.66	.62							3.92
0.05	0.00	0.00	T.	T.	0.27	0.18	0.00	0.24	0.43	0.89	0.01	0.14	0.23	0.09	0.00	T.	4.63
T.					.34	T.		.38	.14	.73	T.	.49	.11	.01		.01	3.41
.08					.25	.27		T.	.76	.97	.02	.07	T.	.27			5.18
				T.	.40	.01		.66	.28	.47	T.		.42	.06			5.07
					.62			.32	.21	.35			.62	.05			4.41
.25					.04	.33		.19	.05	.82	.08		.06	.15			3.97
			.02		*	†.39		.12		1.20			*	†.35			3.99
						.45			1.50	.30		.40	.15				6.35
0.04	0.00	0.00	0.00	0.00	0.00	0.22	0.13	T.	0.28	0.43	0.00	T.	T.	T.	0.37	0.91	6.25
.07							.36		.02	.57				T.	.25	†.29	6.90
.01							.52		.04	.34					*	†.18	4.23
.09						.23			.62	.80					.34	.70	5.30
						.21		T.	.55						1.20	.10	5.90

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Brentwood .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Selawket	T.	.80	.08	.....	.....	.....	.05	.....	.....	.10	.....	.10	1.27	.....
Bedford .....	.11	1.34	.06	.53	T.	.....	.09	.....	.....	.26	.....	2.46	2.49	.....
Primrose .....	.26	.75	.11	.06	.....	.....	.....	.....	T.	.32	.....	.45	1.95	.11
<i>Hudson Valley</i>	0.05	0.48	0.18	0.30	0.10	0.00	0.03	0.00	0.00	0.19	0.01	0.32	1.68	0.14
Albany	T.	.52	.11	.24	.01	.....	.....	.....	.....	.30	T.	.29	1.80	.01
Honeymead Brook	T.	.41	.....	.40	.06	.....	.....	.....	.....	.31	.....	.28	1.81	.....
Poughkeepsie. ....	.....	.28	.05	.38	.....	.....	.03	.....	.....	.09	.....	.45	1.45	.03
Wappinger's Falls. ....	.05	.30	.10	.38	.11	.....	.....	.....	.....	.15	.....	.40	1.16	.04
Catskill .....	.02	.83	.22	.34	.....	.....	.....	.....	.....	.30	.....	.10	3.30	.13
West Point .....	.20	.20	.15	.30	.50	.....	.10	.....	.....	.....	.10	.35	.80	.90
Boyd's Corners .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carmel .....	.11	1.03	*	†.19	.11	.....	.08	.....	.....	.11	.....	.47	1.88	.....
Southeast Reserve .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eagle Mills .....	.....	.25	.60	.03	.....	.....	.....	.....	.....	.24	.....	.18	1.20	.....
Easton .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Mohawk Valley</i>	0.02	0.04	0.27	0.22	0.01	0.12	0.00	0.00	0.12	0.25	0.07	0.24	0.52	0.28
Little Falls (a) .....	.06	.....	.46	.34	.....	.....	.....	.....	.43	.....	.....	.....	.34	.53
Canajoharie	T.	.14	T.	.....	T.	.47	.....	.....	.....	.20	.....	.50	.43	.20
St. Johnsville .....	.....	.01	.22	.48	.03	.....	.....	.....	.....	.33	.....	.04	.23	.06
Rome .....	.....	.....	.51	.08	.....	.....	.....	.....	.05	.46	.27	.42	.47	.35
<i>Champlain Valley</i>	0.00	0.01	0.08	0.22	T.	0.00	0.00	0.00	0.00	0.11	0.00	0.28	0.70	0.16
Plattsburgh Bar'ks .....	.....	.....	.10	.11	T.	.....	.....	.....	.....	.....	.....	.10	.35	.....
Glens Falls .....	.....	.....	.09	.18	.....	.....	.....	.....	.....	.16	.....	.35	.98	.....
Lake George .....	.....	.03	.04	.38	.....	.....	.....	.....	.....	.16	.....	.48	1.01	.13
<i>St. Lawrence Valley</i>	0.10	0.27	0.33	0.43	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.34	0.00	0.32
Madison Barracks .....	.01	.....	.65	1.58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.40
Watertown .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canton .....	.13	.46	.19	.14	.....	.....	.....	.....	.....	.....	.....	.31	.....	.43
DeKalb Junction .....	.14	.28	.06	.07	.....	.....	.....	.....	.....	.....	.....	.28	.....	.34
North Hammond .....	.05	.43	.30	.28	.05	.....	.....	.....	.....	T.	.....	.65	.....	.24
Ogdensburg .....	.05	.43	.....	.50	.....	.....	.....	.....	.....	.05	.....	.49	.....	.16
Potsdam .....	.25	.....	.78	.....	.....	.....	.....	.....	.....	.....	.....	.31	.....	.32
<i>Great Lakes</i>	0.06	0.11	0.11	0.43	0.08	T.	T.	0.00	T.	0.17	0.02	0.32	0.01	0.30
Westfield	T.	.....	.....	.92	.....	.....	.....	.....	.....	.....	.....	.45	.....	.65
Buffalo .....	.03	.12	.09	.54	T.	T.	.....	.....	T.	.45	.....	.49	T.	.30
Adams Center .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsford .....	.04	.01	.10	.48	.....	.....	.....	.....	.....	.10	.....	.60	.....	.25
Rochester	T.	.03	.09	.44	.01	.....	.....	.....	T.	.10	.....	.19	.....	.19
Scottsville .....	.....	.10	.02	.65	.....	.....	.....	.....	.....	.40	.....	.20	.....	.20
Appleton .....	.12	.43	.04	.45	.01	T.	.....	.....	.....	T.	.....	.15	.....	.12
Fort Niagara	T.	.....	.66	.....	1.08	.....	.....	.....	.....	.....	.....	.13	.....	.16
Niagara Falls .....	.34	.33	.15	.67	.24	T.	.....	.....	.....	.01	.....	.14	.....	.17
Baldwinsville .....	.20	T.	.35	.12	.....	.....	.....	.....	T.	.22	.....	.27	T.	.33
Skaneateles .....	.....	.....	.15	.49	.....	.....	.....	.....	.....	.37	.....	.43	.07	.26
Ridgeway .....	.08	.14	.05	.75	.....	T.	.....	.....	.....	.02	.....	.86	.....	.23
Fulton .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.50	.03	.....	.....	.45
Oswego	T.	.14	.02	.40	.....	.....	.....	.....	.....	.05	.....	.36	T.	.55
Palermo .....	.....	.03	.19	.35	.....	.....	.....	.....	.....	.05	.....	.69	.....	.31
Phoenix	T.	.07	.01	.29	.....	.....	.....	.....	.....	.....	.20	.13	.12	.12
Lyons .....	.06	.04	.....	.32	.01	.....	.....	.....	.01	.08	.12	.13	.....	.22
Rose .....	.....	*	†.15	.52	T.	.....	.....	.....	.....	.05	.....	.25	T.	.52
Erie, Pa. ....	.27	.35	T.	.29	.02	T.	T.	.....	T.	.63	.....	.29	.....	.16

TATION FOR MAY — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
...50	...	...	.04	.32	...	T.	T.	...	.37	1.75	5.38
.1126	...	...	.36	.86	...	...	...	T.	.18	.73	9.83
...31	...	T.	.94	.05	...	...	...	T.	.23	.64	6.18
0.07	T.	0.00	T.	0.00	0.00	0.13	0.00	0.00	0.31	0.57	T.	0.08	0.03	0.03	0.02	0.07	4.88
.1417	...	...	.21	.52	.01	.16	.14	.06	T.	T.	4.69
.12	T.	...	...	...	...	...	...	...	.44	.54	...	.02	.02	...	.03	...	4.44
...02	...	...	T.	...	...	.15	.38	...	T.	T.	...	.05	...	3.36
.10	T.	...	...	.02	...	...	.38	.47	T.	.04	.02	.20	...	...	3.92
.10	T.	...	...	...	...	...	T.	.44	...	.04	.03	...	.06	...	5.81
...20	.50	...	...	...	...	...	.30	4.70
...	5.56
.1307	...	...	.28	.99	...	...	...	...	*	† 51	5.96
...75	...	...	.80	.70	...	.42	...	...	...	.20	6.03
...	4.37
0.08	0.00	0.00	0.00	0.00	0.08	0.16	T.	0.06	0.57	0.37	0.28	T.	0.10	0.28	T.	0.00	4.18
.2329	...	...	.65	.48	.22	...	...	.44	.01	...	4.39
...20	T.	...	.52	...	.80	...	.04	.32	...	...	3.82
.1024	...	...	.76	.79	.11	.02	.02	.34	...	...	4.38
...31	...	...	.22	.36	.22	...	...	.36	.04	...	...	4.12
0.27	0.00	0.00	T.	0.00	0.09	0.40	0.00	0.02	0.18	0.44	0.27	0.16	0.27	0.27	0.00	0.09	3.91
.6002	.20	...	...	.23	.15	.80	...	.57	.18	...	...	3.41
.1852	...	...	.05	.16	.53	...	.22	.11	.28	...	...	3.81
.02	T.	...	.26	.48	...	...	.15	.63	.02	.27	.12	.34	...	...	4.52
0.02	0.00	0.00	0.00	0.03	0.44	0.18	0.00	0.20	0.03	0.47	0.00	0.00	0.13	0.14	T.	0.03	3.45
...60	...	...	.25	...	...	...	...	.50	...	...	...	3.99
...45	.24	...	.28	...	.64	...	...	...	.22	...	...	3.49
.1041	.30	...	.24	...	.73	...	...	.09	.10	...	...	3.14
...	T.	...	.25	.38	...	.16	.18	.38	...	...	.08	.38	...	.10	3.91
...47	...	.47	T.	...	.15	...	.38	...	...	.09	T.	T.	.09	2.86
...19	*	† .51	...	...	.12	...	.69	...	...	*	† 13	...	...	3.30
0.03	0.00	T.	T.	T.	0.21	0.09	0.01	0.19	0.09	0.05	0.03	0.00	0.11	0.05	0.03	0.02	2.55
...	...	T.	...	...	*	† .86	...	.22	...	...	...	...	.38	...	...	...	3.48
...30	.12	...	.03	.01	T.	...	...	.05	T.	T.	.04	2.62
...	2.10
...28	...	...	.01	...	.01	...	...	.15	.07	...	...	2.10
T.	T.	.14	.02	...	.01	...	.01	...	...	.05	.05	...	T.	1.33
...08	...	...	.10	...	...	...	...	.14	...	...	...	1.89
...34	.02	...	.37	.01	T.	...	...	.08	...	.16	.16	2.46
...48	...	...	.26	...	...	...	...	.05	...	.25	...	3.07
...43	.05	...	.38	.02	.01	...	...	.08	T.	.02	.19	3.23
...29	...	T.	.15	.07	...	...	...	.22	...	...	...	2.22
...35	...	.35	.07	.24	.06	...	.15	.32	...	...	3.31
...32	.06	...	.10	.04	...	...	...	.12	...	...	...	2.77
...31	.71	...	...	...	...	...	.07	2.07
...26	.24	...	.25	.01	.28	...	...	.13	.07	...	...	2.76
...05	.35	...	.25	...	.09	.30	...	*	† 33	...	...	2.99
.5715	.06	.26	.15	.24	...	...	.22	T.	...	2.59
...07	...	...	.19	.28	.08	...	...	.12	...	...	...	1.84
...	T.	...	.12	.05	...	*	† .24	.05	...	...	.12	.65	...	...	2.12
...	T.	...	.46	.22	...	.20	...	...	...	...	.05	.01	.09	...	3.04

DAILY AND MONTHLY PRECIPITATION

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.04	0.22	0.34	0.33	T.	0.01	0.02	0.00	0.03	0.56	0.05	0.42	0.19	0.27
Fleming .....	.....	.....	.....	†.71	.....	.....	.....	.....	.....	.30	.....	.31	.20	.....
Sherwood .....	.20	.11	.69	.11	.....	.04	.....	.....	.....	.13	.67	.23	.07	.05 .23
Watkins .....	.....	.35	.69	.52	.....	.....	.....	.....	.....	.53	.....	.41	.20	.19
Romulus .....	.....	T.	.08	.46	.....	.....	.10	.....	.....	.06	.....	1.14	T.	.76
Ithaca .....	.....	.63	.48	.14	T.	.....	.....	.....	.....	.69	.....	.15	.52	.15
Average	0.04	0.30	0.20	0.31	0.04	0.01	0.01	T.	0.02	0.26	0.02	0.40	0.62	0.25

† Record for the month incomplete.
 polated from values at other stations.

|| Received too late to be included in the averages.

TATION FOR MAY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	0.00	0.00	T.	0.00	0.04	0.01	0.00	0.15	0.06	0.59	0.00	0.00	0.17	0.10	T.	0.00	3.60
.01	.....	.....	.....	.....	.09	.....	.....	.34	.10	.65	.....	.....	.....	.....	.....	.....	2.17
.....	.....	.....	.....	.....	.10	.....	.....	.17	.....	.13	.....	.....	.....	.....	.....	.....	3.67
.....	.....	.....	.....	.....	.10	.....	.....	.17	.....	.76	.....	.....	.....	.20	.01	.....	3.53
.....	.....	.....	.....	T.	T.	.....	T.	.09	1.12	.....	.....	.....	.31	.08	.....	.....	4.80
.....	.....	.....	.....	.....	.05	.....	.25	.11	.31	.....	.....	.....	.09	.20	.....	.....	3.84
0.06	T.	T.	T.	T.	0.13	0.17	0.01	0.13	0.29	0.42	0.05	0.04	0.12	0.11	0.04	0.11	4.14

*Amount included in next measurement. †Not included in computing averages. §Inter

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).									
		Normal for the month of May.	Length of record, years.	Record begins.	Record ends.	Mean for May, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR MAY.			
								High st.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		56.1	...	...	...	54.9	-1.2	...	...	...	...
Angelica	Allegany	54.3	16	1851	1897	52.5	-1.8	60.8	1896	51.0	1891
Humphrey	Cattaraugus	55.6	14	1884	1897	53.6	-2.0	62.0	1896	53.0	1891
Elmira	Chemung	58.4	18	1851	1897	58.6	+0.2	65.2	1896	54.3	1856
<i>Eastern Plateau.</i>		55.4	...	...	...	54.7	-0.7	...	...	...	...
Oxford	Chenango	55.6	39	1828	1897	55.0	-0.6	60.4	1831	50.8	1838
Cortland	Cortland	53.7	33	1829	1897	54.1	+0.4	60.2	1896	47.9	1861
Cooperstown	Otsego	54.6	44	1854	1897	53.6	-1.0	60.7	'80-'87	46.7	1861
Waverly	Tioga	57.5	15	1883	1897	56.0	-1.5	62.8	1896	54.5	'90-'91
<i>Northern Plateau.</i>		54.4	...	...	...	53.2	-1.2	...	...	...	...
Lowville	Lewis	54.4	33	1827	1897	53.2	-1.2	59.1	1818	48.8	1857
<i>Atlantic Coast.</i>		58.8	...	...	...	58.8	0.0	...	...	...	...
New York City	New York	59.6	27	1871	1897	59.0	-0.6	64.8	1880	53.5	1882
Setauket	Suffolk	58.0	12	1886	1897	58.6	+0.6	61.5	1896	55.3	1888
<i>Hudson Valley.</i>		59.1	...	...	...	58.8	-0.4	...	...	...	...
Albany	Albany	59.5	24	1874	1897	59.0	-0.5	66.4	1880	55.9	1882
Honeynead Brook	Dutchess	57.7	17	1881	1897	56.7	-1.0	62.2	1896	51.7	1882
West Point	Orange	60.2	68	1826	1897	60.6	+0.4	...	...	...	...
<i>Champlain Valley.</i>		55.3	...	...	...	53.7	-1.6	...	...	...	...
Plattsburgh Barracks..	Clinton	55.3	43	1839	1897	53.7	-1.6	63.1	1847	50.3	1882
<i>St. Lawrence Valley.</i>		55.6	...	...	...	54.7	-1.2	...	...	...	...
Madison Barracks.	Jefferson	54.8	37	1839	1896	...	...	62.6	1880	50.6	1882
Canton	St. Lawrence	56.6	36	1862	1897	54.4	-2.2	65.9	1887	51.6	'66-'83
North Hammond	"	56.1	19	1867	1897	55.0	-1.1	63.3	1870	50.3	1867
Potsdam	"	55.0	30	1828	1897	54.6	-0.4	62.4	1848	49.3	1842
<i>Great Lakes.</i>		55.3	...	...	...	54.7	-0.6	...	...	...	...
Buffalo	Erie	54.0	27	1871	1897	54.0	0.0	61.6	1887	49.3	1882
Rochester	Monroe	56.6	27	1871	1897	56.0	-0.6	64.2	1880	50.1	1882
Fort Niagara	Niagara	53.9	39	1842	1897	54.8	+0.9	62.9	1880	48.3	1866
Baldwinsville	Onondaga	55.3	21	1854	1897	56.8	+1.5	63.4	1896	46.8	1857
Oswego	Oswego	54.2	27	1871	1897	53.0	-1.2	61.4	1880	50.4	1882
Palermo	"	56.2	44	1854	1897	54.0	-2.2	60.9	1887	47.5	1867
Erie, Pennsylvania	Erie	56.9	24	1874	1897	54.0	-2.9	65.0	1880	51.0	1882
<i>Central Lakes.</i>		57.5	...	...	...	55.3	-2.2	...	...	...	...
Ithaca	Tompkins	57.5	19	1879	1897	55.3	-2.2	64.6	1880	52.2	1882
Average departure..		...	...	...	...	...	-0.8	...	...	...	...

AND PRECIPITATION — MAY.

STATION.	COUNTY.	PRECIPITATION—(INCHES).									
		Average for the month of May.	Length of record, years.	Record begins.	Record ends.	Total for May, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR MAY.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau</i>		4.38	...	...	...	4.49	+0.11	...	...	...	...
Angelica	Allegany	3.97	13	1871	1897	4.07	+0.10	8.82	1894	1.00	1872
Humphrey	Cattaraugus	4.82	14	1884	1897	3.84	-0.98	9.50	1894	1.45	1891
Elmira	Chemung	4.35	18	1851	1897	5.56	+1.21	7.65	1894	0.50	1891
<i>Eastern Plateau</i>		3.99	...	...	...	4.83	+0.84	...	...	...	...
Oxford	Chenango	3.65	27	1829	1897	5.47	+1.82	6.18	1844	1.04	1843
Cortland	Cortland	4.42	19	1851	1897	4.23	-0.19	7.96	1892	1.79	1862
Cooperstown	Otsego	3.64	44	1854	1897	5.21	+1.57	8.84	1890	0.36	1879
Port Jervis	Orange	4.61	13	1880	1897	5.57	+0.96	8.44	1893	1.22	1880
Waverly	Tioga	3.63	15	1883	1897	3.66	+0.03	7.54	1893	0.59	1891
<i>Northern Plateau</i>		2.90	...	...	...	3.97	+1.07	...	...	...	...
Lowville	Lewis	2.90	35	1827	1897	3.97	+1.07	6.78	1893	1.02	1841
<i>Atlantic Coast</i>		3.20	...	...	...	5.34	+2.14	...	...	...	...
New York City	New York	2.99	27	1871	1897	5.30	+2.31	6.53	1886	0.73	1877
Setauket	Suffolk	3.40	12	1886	1897	5.38	+1.98	5.87	1893	0.10	1887
<i>Hudson Valley</i>		3.74	...	...	...	4.55	+0.81	...	...	...	...
Albany	Albany	3.18	24	1874	1887	4.69	+1.51	5.30	1892	0.89	1879
Honeymead Brook.	Dutchess	3.73	17	1881	1897	4.44	+0.71	7.21	1893	0.94	1887
Poughkeepsie	"	3.54	32	1830	1897	3.36	-0.18	7.06	1893	1.14	1845
West Point	Orange	4.54	52	1840	1897	4.70	+0.16	11.66	1868	1.02	1877
Boyd's Corners.	Putnam	3.70	27	1870	1897	5.56	+1.86	8.18	1893	0.85	1877
<i>Champlain Valley</i>		2.66	...	...	...	3.41	+0.75	...	...	...	...
Plattsburgh Barracks..	Clinton	2.66	37	1840	1897	3.41	+0.75	7.13	1850	0.18	1879
<i>St. Lawrence Valley</i>		3.01	...	...	...	3.73	+0.72	...	...	...	...
Madison Barracks	Jefferson	2.53	37	1841	1897	3.99	+1.46	8.25	1889	0.28	1888
North Hammond	St. Lawrence	3.37	19	1867	1897	3.91	+0.54	8.09	1867	0.66	1876
Potsdam	"	3.14	23	1828	1897	3.30	+0.16	5.38	1893	0.79	1891
<i>Great Lakes</i>		2.95	...	...	...	2.64	-0.36	...	...	...	...
Buffalo	Erie	3.37	27	1871	1897	2.62	-0.75	7.35	1892	0.53	1877
Rochester	Monroe	3.20	27	1871	1897	1.33	-1.87	6.87	1894	1.12	1891
Fort Niagara	Niagara	2.85	39	1842	1897	3.07	+0.22	7.31	1894	0.58	1877
Oswego	Oswego	2.81	27	1871	1897	2.76	-0.05	7.63	1883	0.54	1877
Palermo	"	2.04	38	1860	1897	2.99	+0.95	6.90	1867	0.30	1870
Erie, Pennsylvania	Erie	3.45	24	1874	1897	3.04	-0.41	8.05	1892	1.04	1879
<i>Central Lakes</i>		4.10	...	...	...	3.84	-0.26	...	...	...	...
Ithaca	Tompkins	4.10	19	1879	1897	3.84	-0.26	7.24	1894	0.61	1891
Average departure.		...	...	...	...	...	+0.54	...	...	...	...

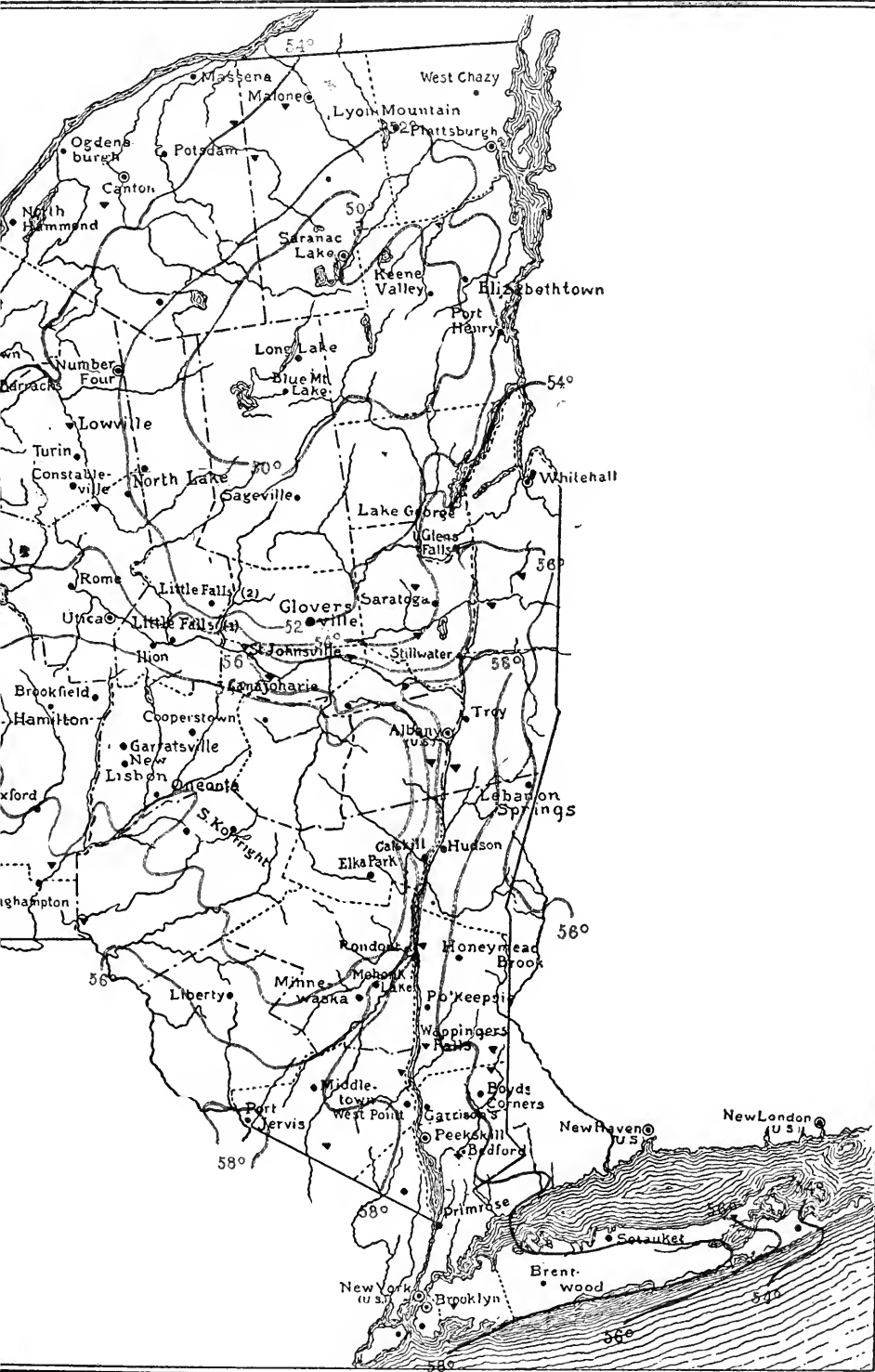
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR MAY, 1897.



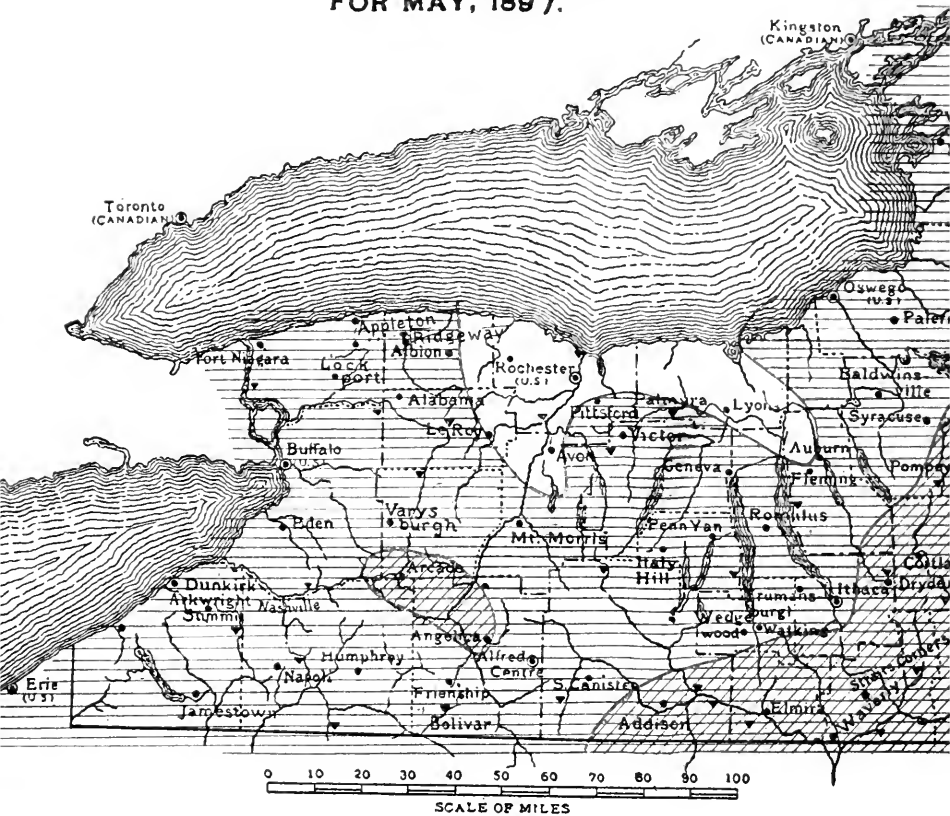


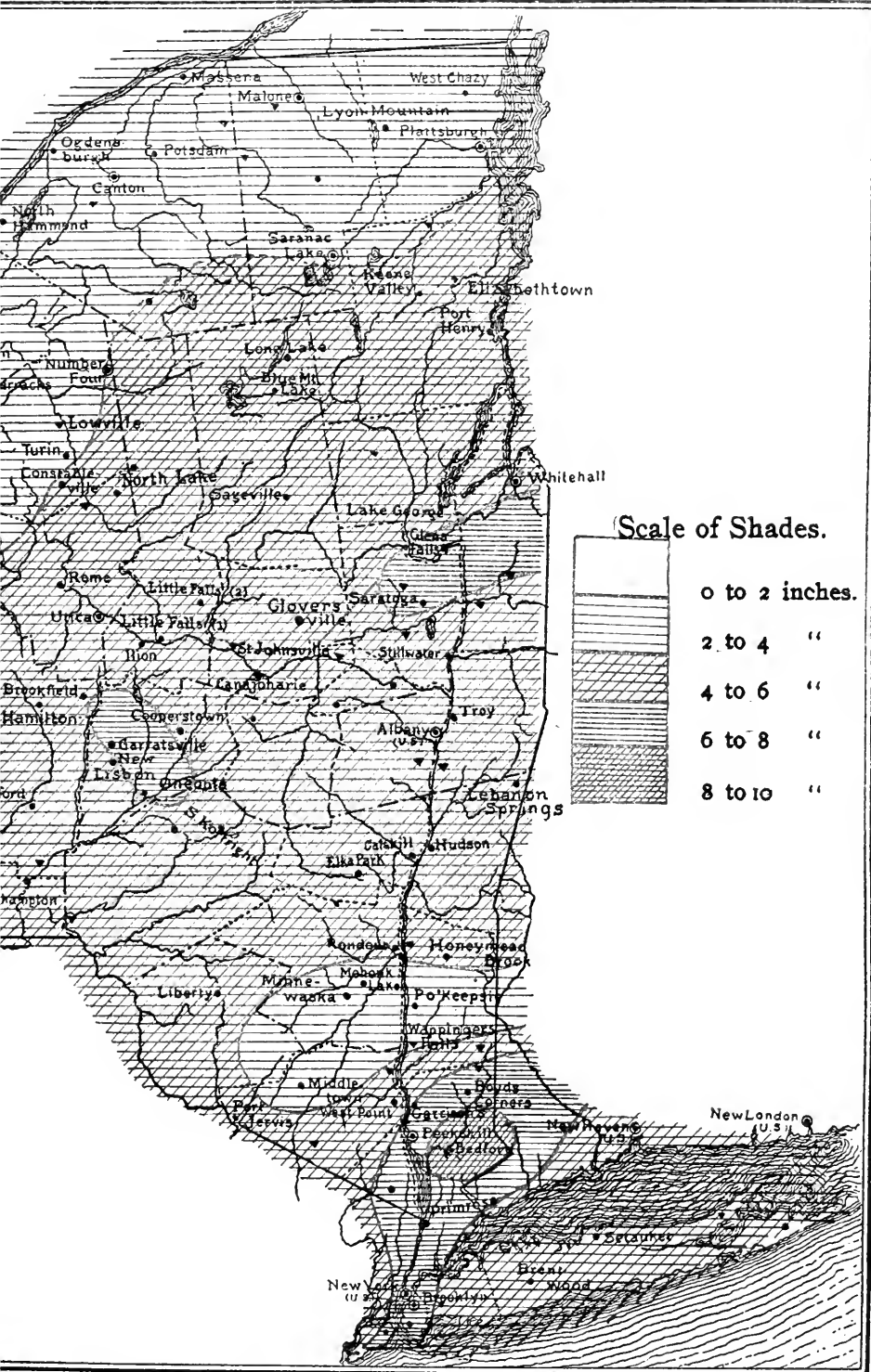
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR MAY, 1897.





Meteorological Summary for June, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during June, 1897, was 29.95 inches. The highest barometer was 30.27 inches at New York city on the 7th, and the lowest was 29.63 inches at Ithaca on the 13th. The mean pressure was greatest at Erie, Pa., and least at Oswego. The average pressure at six stations of the National Bureau was 0.01 inches below the normal, deficiencies occurring at four stations.

The mean temperature of the State was 61.6 degrees, as derived from the records of 76 stations. The highest local monthly mean was 68.1 degrees at Brooklyn, and the lowest 55.2 degrees at Number Four. The highest general daily mean was 74.0 degrees on the 24th, the lowest being 51.0 degrees on the 1st. The maximum temperature reported was 93 degrees at Avon on the 24th, and at Brentwood on the 30th, the minimum being 29 degrees at New Lisbon and Number Four on the 2d. The mean monthly range of temperature for the State was 48 degrees, the greatest local range being 60 degrees at Avon, and the least, 33 degrees, at Buffalo. The mean daily range was 20 degrees; the greatest local daily range being 48 degrees at Avon on the 3d and at Oxford on the 28th; while the least value was 2 degrees at Buffalo on the 4th and at Friendship on the 9th. The mean temperatures of the several regions were as follows: The Western Plateau, 60.5 degrees; the Eastern Plateau, 60.5 degrees; the Northern Plateau, 58.1 degrees; the Atlantic Coast Region, 65.2 degrees; the Hudson Valley, 64.1 degrees; the Mohawk Valley, 61.1 degrees; the Champlain Valley, 61.7 degrees; the St. Lawrence Valley, 60.8 degrees; the Great Lake Region, 62.1 degrees; the Central Lake Region, 62.0 degrees. The average of the mean temperatures at 25 stations possessing records for previous years was 4.1 degrees below the normal; the mean being the lowest on record for June at the

following stations: Angelica, Humphrey, Waverly, Honeymead Brook, Canton, North Hammond, Palermo and Ithaca, and only equaled at Albany in 1878 and at Erie, Pa., in 1881.

The mean relative humidity for the State was 72 per cent. The mean dew point was 51 degrees.

The average precipitation for the State was 3.63 inches of rain, as derived from the records of 100 stations. The heaviest general precipitation ranging from 4 to over 6 inches, occurred in the eastern-central section of the State; while in the extreme western counties adjacent to the great lakes, and in a portion of the St. Lawrence Valley the amount was under 2 inches. The greatest local rainfall was 6.72 inches at Gloversville, the least amount being 1.03 inches at Madison Barracks. The average total precipitation at 27 stations possessing records for previous years was 0.06 inches below the normal amount.

The average number of days on which the precipitation was 0.01 inches or more was 9.7. The rain frequency was greatest in northeastern New York and in portions of the southern tier of counties. The average number of clear days was 11.2; of partly cloudy days, 10.6; and of cloudy days, 8.2; giving an average cloudiness of 48 per cent. for the State. The least amount of cloud prevailed in the eastern-central section of the State.

The prevailing winds were from the northwest. The average total wind-travel at 6 stations of the National Bureau was 6,137 miles, the travel being generally in excess of the usual values for June, both along the Atlantic Coast and the Great Lakes. The maximum velocity recorded at the above stations was 53 miles per hour at New York on the 1st.

Electrical storms (including distant thunder or lightning) were reported on 13 dates, as follows: On the 3d at 13 stations of all sections; on the 4th at 3 southeastern stations; on the 6th at Humphrey and Jamestown; on the 7th at Jamestown; on the 13th at 12 stations in eastern and northern New York, and near the southern border; on the 14th at 4 eastern stations; on the 15th at 5 eastern and southwestern stations; on the 16th at 3 eastern stations; on the 19th at 5 southwestern stations and at St. Johnsville; on the 20th at Addison and 3

coast stations; on the 23d at Angelica; on the 24th at 10 stations in the northwest, 5 near the Central Lakes, and at St. Johnsville; on the 29th at Jamestown and Franklinville; on the 30th at 8 stations of the southern and southeastern counties.

Hail fell on the 1st, 3d, 13th and 15th.

Auroras were reported on the 22d and 27th.

Lunar halos were observed on the 6th and 11th.

Light frosts occurred in western and northern New York on the 1st and 2d. Killing frosts occurred on the 21st and 22d in the vicinity of Allegany county, and light frosts were generally reported, except in the Coast Region.

GENERAL FEATURES OF THE WEATHER.

This month was exceptionally cool, the temperature rising to, or above, the normal only on the 3d and 4th and the 23d to 25th. The principal cold periods occurred about the 2d and 21st, with daily temperatures 15 degrees below normal, and severe frosts in the southwest and also in some northern localities. The rainfall was greater than usual in much of the eastern and central sections, but much lighter in the west. About the usual rain frequency and cloudiness obtained for the State at large, fair weather prevailing generally after the 10th. The continued low temperature kept vegetation in a backward condition throughout the month.

Seven areas of high pressure, and the same number of depressions, influenced our weather this month. The lows were of small intensity, usually developing and moving eastward near or beyond the Canadian border, broadening out when over the northeastern States and coast. The highs were large but ill-defined areas, whose maximum pressures were usually under 30.3 inches. The following is a brief account of the pressure systems of the month:

High I, 30.2 inches over the Upper Lakes on the 1st, high winds into a low (the last of May) on the northeast coast. The high pressure over New York to the Central Coast on the 2d, giving clear weather, and on the 3d to the southeast coast, forcing warm southerly winds into

Low I, 29.7-29.9 inches, over the Upper Lakes on the 3d, spreading over Canada on the three days following, giving thunderstorms or showers, heaviest in the east.

High II, 30.3 inches, developed over the eastern Canadian Provinces on the 5th, and continuing near the northeast coast until the 9th, with cloudy weather. General rainfall on the 8th and 9th, being heavy in the west on the 8th. This area was immediately followed by

High III, 30.2 inches, which passed from the lakes to the Central Coast, on the 10th and 11th, giving cool northerly winds toward

Low II, 29.8 inches, passing northward off the coast on the 9th to 11th. Flooding rains fell in eastern New York on the 10th.

Low III, 29.8 inches, passed along the northern border, uniting with II on the northeast coast on the 11th; light rain falling in eastern New York. The area was over Canada on the 12th, temperature rising slightly.

Low IV, 29.7 inches, moving from the northwest, united with III over Canada on the 12th to 13th, light showers falling in New York.

High IV, 30.0 inches, covered the Central States on the 11th, then passed to the Southern States, and on the 13th to 16th spread northward to Canada, giving pleasant weather.

High V, 30.1 inches, developed on the lakes on the 18th, passing to the Central Coast on the 19th, accompanied by fair weather.

Low V, 29.6 inches, developed in the northeast on the 20th, when light showers occurred in New York. This area dissipated on the 21st and 22d and was replaced by

High VI, 30.1 inches, over the Central States on the 21st, spreading over the coast on the two days following. It brought fair weather and severe frosts on the 21st and 22d.

Low VI, 29.6 inches, moving from the northwest, became general over Canada on the 22d, shifting slowly over that region until the 25th. The area brought a warm wave, while fair weather prevailed excepting on the 24th, when thunderstorms and high winds occurred in western New York.

High VII, 30.2 inches, originating in the northwest, reached the lakes and Northeastern States on the 27th, bringing a decided fall of temperature. This area passed to the northeast coast on the 29th and 30th, the weather continuing fair until the latter date, when

Low VII, 29.7 inches, passed over the lakes and down the St. Lawrence Valley, giving scattered thunderstorms in the south and east, with rising temperatures.

FARMING NOTES: The low temperature of June, with the cloudy, showery weather of the first decade, were reported to be favorable for grass and grains, which generally made a luxuriant growth. Small fruits and vegetables were kept in a very backward condition, although maintaining a vigorous condition in most cases. Potatoes and corn seedling rotted in the ground to a considerable extent, making it necessary to replant. A large amount of hay was gathered in good condition during the fine weather near the close of the month. Wheat headed during the second week, and much of it was nearly ready for harvesting by the end of the month. Cherries, apples, pears and plums were generally well set and grew finely; but "tent worms," which were very numerous, seriously threatened the apple crop, and various insect pests injured other fruits to a considerable extent. The strawberry crop was good and very large in the southeast, where some berries were picked during the first week. Hops promised well early in the month, but later the prospects were less favorable. Tobacco was transplanted on or before the 26th, and also suffered somewhat from cool weather. Damage from the frosts of the 21st was confined mainly to the valleys in the vicinity of the southwestern highlands.

Miscellaneous notes from observers at the following points: Friendship, high winds during a thunderstorm on the 24th blew down and uprooted trees. Humphrey, strawberries blossomed on the 3d, blackberries on the 15th, rye heading on the 12th. Wedgewood, first fireflies seen on the 23d.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Western Plateau.</i>														
Alfred	Allegany	1795	.....	.....	.....	.....	.....	.....	.....	.....	58.4	60.5	93	24
Angelica		1340	.....	.....	.....	.....	.....	.....	.....	.....	59.1	58.4	82	24
Bolivar		1800	.....	.....	.....	.....	.....	.....	.....	.....	59.0	59.1	86	24
Friendship		1550	.....	.....	.....	.....	.....	.....	.....	.....	60.3	85	24	23
Franklinville	Cattaraugus	1598	.....	.....	.....	.....	.....	.....	.....	.....	58.9	58.9	84	24
Humphrey	"	1950	.....	.....	.....	.....	.....	.....	.....	.....	60.4	59.4	82	24
† Arkwright	Chautauqua	1260	.....	.....	.....	.....	.....	.....	.....	.....	60.2	59.4	78	24
Jamestown	"	1324	.....	.....	.....	.....	.....	.....	.....	.....	61.2	61.2	86	24
Elmira	Chemung	863	.....	.....	.....	.....	.....	.....	.....	.....	65.2	86	24	87
Avon	Livingston	585	.....	.....	.....	.....	.....	.....	.....	.....	62.1	62.1	93	24
Mt. Morris		525	.....	.....	.....	.....	.....	.....	.....	.....	61.6	61.6	84	a
Lockport		Niagara	659	.....	.....	.....	.....	.....	.....	.....	60.8	61.6	84	a
Victor		Ontario
Wedgewood	Schuyler	1350	.....	.....	.....	.....	.....	.....	.....	.....	60.5	61.9	87	b
Addison	Steuben	1000	.....	.....	.....	.....	.....	.....	70	52	61.7	61.0	86	24
South Canisteo	"	1480	.....	.....	.....	.....	.....	.....	76	52	58.2	58.7	86	24
Arcade	Wyoming	1707	.....	.....	.....	.....	.....	.....	.....	.....	60.0	59.2	85	24
<i>Eastern Plateau</i>														
Binghamton (1)	Broome	870	.....	.....	.....	.....	.....	.....	.....	.....	60.5	60.5	91	24
Binghamton (2)	"	875	.....	.....	.....	.....	.....	.....	.....	.....	61.2	61.0	85	24
Oxford	Chenango	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.0	61.0	85	24
Cortland	Cortland	1120	.....	.....	.....	.....	.....	.....	.....	.....	60.6	60.6	91	24
South Kortright	Delaware	1700	.....	.....	.....	.....	.....	.....	.....	.....	59.8	59.8	86	15
Brookfield	Madison	1350	.....	.....	.....	.....	.....	.....	.....	.....	60.6	60.6	91	24
Middle-town	Orange	700	.....	.....	.....	.....	.....	.....	.....	.....	63.8	63.8	86	25
Port Jervis	"	470	.....	.....	.....	.....	.....	.....	.....	.....	60.1	59.5	85	24
Cooperstown	Otsego	1250	.....	.....	.....	.....	.....	.....	.....	.....	60.1	59.5	85	24
Garrattsville	Otsego	.....	.....	.....	.....	.....	.....	.....	.....	.....	57.5	58.0	83	24
New Lisbon	"	1334	.....	.....	.....	.....	.....	.....	.....	.....	56.4	57.2	84	24
Oneonta	"	1100	.....	.....	.....	.....	.....	.....	.....	.....	59.6	61.7	88	24
Perry City	Schuyler	1038	.....	.....	.....	.....	.....	.....	.....	.....	59.7	60.0	87	23
Straits Corners	Tioga	.....	.....	.....	.....	.....	.....	.....	.....	.....	60.2	60.2	86	24
Waverly	"	824	.....	.....	.....	.....	.....	.....	.....	.....	63.4	62.0	85	c
Dryden	Tompkins	1079	.....	.....	.....	.....	.....	.....	.....	.....	60.6	60.6	87	24
Mohonk Lake	Ulster	1245	.....	.....	.....	.....	.....	.....	.....	.....	62.5	63.4	82	25
<i>Northern Plateau.</i>														
Saranac Lake	Franklin	.....	.....	.....	.....	.....	.....	.....	.....	.....	58.1	58.1	88	24
Gloversville	Fulton	850	.....	.....	.....	.....	.....	.....	.....	.....	60.8	58.4	84	d
Little Falls (2a)	Herkimer	1526	.....	.....	.....	.....	.....	.....	.....	.....	60.4	60.4	83	24
North Lake	Herkimer	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.5	55.5	82	25
Lewville	Lewis	900	.....	.....	.....	.....	.....	.....	.....	.....	58.8	58.8	86	24
Number Four	"	1571	29.95	30.18	8	29.75	13	0.43	76	49	55.2	55.2	82	24
<i>Atlantic Coast.</i>														
Brooklyn	Kings	70	.....	.....	.....	.....	.....	.....	.....	.....	65.2	65.2	93	30
Manhattan Beach .....	"	.....	.....	.....	.....	.....	.....	.....	.....	.....	68.1	68.1	91	25

FOR JUNE, 1897.

TURE — (IN DEGREES FAHR.).							SKY.			PRECIPITATION — (INCHES).						Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.		
30	g	50	23	48	3	2	9	11.8	11.5	6.7	10.5	2.74	1.48	<i>h. m.</i>	24-25	.....	N. W.
34	2	48	21	36	2	5	8	4	18	8	11	2.97	1.03	.....	24	.....	N. W.
31	21	55	25	41	23	4	9	5	19	6	11	5.56	1.48	.....	24-25	.....	N. W.
30	2	55	26	43	2	8	9	7	14	9	12	3.44	0.63	.....	8	.....	S. W.
32	21	52	28	46	2	2	9	14	12	4	12	2.93	0.60	.....	24	.....	S. W.
30	21	54	23	39	<i>n</i>	5	8	12	9	9	13	1.71	0.48	.....	29-30	.....	N. W.
36	21	46	20	34	2	3	8	5	14	11	13	3.71	1.17	.....	30	.....	S. W.
41	1	37	13	20	2	5	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
37	2	49	20	38	2	6	8	4	23	3	11	2.06	0.99	.....	7	.....	S. W.
40	21	47	21	40	23	8	9	21	1	3	6	1.76	0.59	.....	24	.....	N. W.
33	3	60	27	48	3	10	9	13	11	6	7	1.96	0.45	.....	30	.....	.....
39	23	45	24	33	<i>p</i>	11	9	17	5	4	6	2.10	1.20	.....	29-30	.....	W.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.53	0.63	24.00	7-8	.....	W.
38	g	49	24	41	28	6	8	8	18	4	12	2.74	1.03	17.00	29-30	.....	S. W.
35	g	51	24	39	22	7	8	22	2	6	15	2.56	0.70	.....	8	.....	S. W.
30	21	56	23	42	28	11	8	15	7	8	12	3.48	0.90	.....	8	.....	W.
33	21	52	22	35	<i>f</i>	5	9	9	12	9	10	2.64	0.90	13.25	29	.....	.....
29	2	50	24	48	28	4	<i>af</i>	14.8	9.4	5.8	9.5	3.85	2.50	.....	9	.....	.....
37	2	48	22	36	22	5	8	8	11	11	15	3.76	1.05	23.00	4	.....	S. E.
40	28	45	23	37	23	5	8	13	8	9	14	2.93	0.76	.....	4	.....	N. W.
32	2	59	30	48	22	10	<i>af</i>	7	19	4	8	4.80	2.05	14.00	29-30	.....	W.
35	2	51	24	39	<i>r</i>	6	9	20	7	3	9	3.81	1.02	.....	30	.....	S.
32	21	55	29	44	28	7	20	.....	.....	.....	7	5.00	.....	.....	.....	.....	.....
42	<i>h</i>	44	23	35	<i>s</i>	5	<i>ag</i>	23	2	5	8	3.24	1.45	.....	8	.....	N. W.
38	2	47	17	32	28	4	9	16	7	7	5	5.22	2.50	.....	9	.....	N.
37	21	46	23	36	28	10	7	21	7	2	4	2.44	2.35	13.00	29-30	.....	W.
29	2	55	26	44	28	8	<i>af</i>	11	11	3	8	4.10	1.44	.....	9	.....	S. W.
35	2	53	27	42	28	11	9	.....	.....	.....	8	5.31	1.35	.....	29	.....	.....
35	2	52	27	40	<i>t</i>	8	9	11	10	9	14	4.18	1.31	.....	30	.....	N. W.
35	2	51	27	44	23	5	10	18	9	3	13	3.64	1.00	.....	3	.....	S.
34	g	51	25	44	28	4	8	13	13	4	12	3.22	1.50	6.00	3	.....	N. W.
33	1	54	26	37	<i>u</i>	7	<i>af</i>	.....	.....	.....	14	3.76	1.93	.....	29-30	.....	N. W.
46	9	36	15	21	<i>v</i>	6	<i>ah</i>	16	9	5	4	2.29	.....	.....	.....	.....	N. W.
29	2	51	22	38	23	4	9	10.2	11.3	8.5	11.2	4.69	2.59	.....	9	.....	.....
30	1	58	22	32	18	7	9	8	16	6	14	3.75	1.64	.....	9	.....	W.
38	2	46	22	38	23	6	8	11	11	8	12	6.72	2.59	.....	9	.....	W.
35	1	48	27	36	23	4	9	10	2	18	12	5.49	1.30	12.45	8	.....	W.
32	23	50	21	29	26	10	10	16	9	5	6	4.50	1.30	.....	19	.....	N. E.
35	2	51	22	38	23	6	9	7	18	5	11	3.40	1.16	.....	9	.....	W.
29	2	53	21	33	28	6	<i>af</i>	9	12	9	12	4.29	1.78	.....	10	.....	W.
36	2	44	20	39	15	3	9	10.8	11.0	8.2	9.7	3.00	2.05	.....	9	.....	.....
49	2	42	19	33	28	5	9	13	8	9	10	2.60	1.24	.....	9	.....	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA.				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.
<i>Atlantic Coast (con.)</i>														
New York City.....	New York ..	314	29.96	30.27	7	29.65	13	0.62	68	...	65.0	86	25	
Willels Point.....	Queens.....	...	...	...	...	...	...	...	...	...	65.8	88	30	
Brentwood.....	Suffolk.....	80	...	...	...	...	...	...	...	...	64.2	93	30	
Setauket.....	Suffolk.....	40	...	...	...	...	...	...	72	56	64.0	85	25	
Bedford.....	Westchester..	296	...	...	...	...	...	...	...	...	62.6	86	e	
Primrose.....	".....	200	...	...	...	...	...	...	...	...	66.0	90	e	
<i>Hudson Valley</i>														
Albany.....	Albany.....	97	29.95	30.25	8	29.70	13	0.55	71	53	64.1	90	26	
Honeymead Brock..	Dutchess.....	450	...	...	...	...	...	...	...	...	62.6	85	25	
Poughkeepsie.....	".....	180	...	...	...	...	...	...	...	...	63.0	84	c	
|| Wappinger's Falls	Dutchess.....	110	...	...	...	...	...	...	...	...	65.8	89	25	
Catskill.....	Greene.....	450	...	...	...	...	...	...	...	...	63.0	88	25	
West Point.....	Orange.....	167	...	...	...	...	...	...	...	...	65.6	90	26	
Carmel.....	Putnam.....	500	...	...	...	...	...	...	...	...	65.8	89	25	
<i>Mohawk Valley</i>														
Little Falls (1a).....	Herkimer.....	924	...	...	...	...	...	...	...	...	61.1	92	24	
Canajoharie.....	Montgomery..	300	...	...	...	...	...	...	...	...	59.1	86	25	
St. Johnsville.....	".....	810	...	...	...	...	...	...	...	...	62.4	90	24	
Rome.....	Oneida.....	445	...	...	...	...	...	...	...	...	60.2	86	24	
			...	...	...	...	...	...	...	...	62.2	92	24	
<i>Champlain Valley</i>														
Plattsburgh Barracks.	Clinton.....	125	...	...	...	...	...	...	...	...	61.7	86	c	
Glens Falls.....	Warren.....	340	...	...	...	...	...	...	...	...	61.6	83	26	
Lake George.....	".....	350	...	...	...	...	...	...	73	53	62.1	86	c	
			...	...	...	...	...	...	...	...	61.4	61.4	86	25
<i>St. Lawrence Valley</i>														
Madison Barracks..	Jefferson.....	266	...	...	...	...	...	...	...	...	60.8	88	24	
Watertown.....	".....	486	...	...	...	...	...	...	...	...	59.4	85	c	
Canton.....	St. Lawrence..	304	...	...	...	...	...	...	...	...	60.6	60.5	88	24
North Hammond...	St. Lawrence..	300	...	...	...	...	...	...	...	...	61.3	61.6	88	24
Ogdensburg.....	".....	258	...	...	...	...	...	...	...	...	61.6	80	d	
|| Potsdam.....	".....	300	...	...	...	...	...	...	...	...	60.8	60.4	85	24
<i>Great Lakes</i>														
Westfield.....	Chautauqua..	758	...	...	...	...	...	...	...	...	62.1	90	24	
Buffalo.....	Erie.....	768	29.96	30.21	2	29.75	13	0.46	67	50	63.2	85	c	
Pittsford.....	Monroe.....	502	...	...	...	...	...	...	...	...	62.0	77	24	
			...	...	...	...	...	...	...	...	61.4	61.9	87	24
Rochester.....	Monroe.....	523	29.95	30.20	2	29.73	13	0.47	64	50	63.0	86	24	
Appleton.....	Niagara.....	301	...	...	...	...	...	...	...	...	61.6	88	24	
Fort Niagara.....	".....	263	...	...	...	...	...	...	...	...	...	...	...
Baldwinsville.....	Onondaga.....	399	...	...	...	...	...	...	...	...	62.1	63.4	90	24
Ridgeway.....	Orleans.....	...	...	...	...	...	...	...	...	...	62.5	86	24	
Oswego.....	Oswego.....	335	29.93	30.22	2	29.69	13	0.53	71	49	60.0	85	24	
Palermo.....	Oswego.....	460	...	...	...	...	...	...	...	...	60.6	61.0	89	24
Lyons.....	Wayne.....	407	...	...	...	...	...	...	...	...	63.2	88	24	
Erie, Pa.....	Erie.....	711	29.98	30.22	27	29.77	31	0.45	71	53	62.0	81	23	

FOR JUNE, 1897—(Continued).

TEMPERATURE—(IN DEGREES FAHR.).								SKY.	PRECIPITATION—(INCHES).							Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.		Total snowfall.
48	1	38	15	21	15	5	7	9	12	9	9	2.98	1.41	<i>h. m.</i>	9	.....	N. W.
47	1	41	19	23	15	4	9	.....	.....	.....	10	2.67	0.95	.....	9	.....	N. E.
36	2	57	25	38	<i>to</i>	7	9	17	4	9	9	3.50	1.10	11.00	9	.....	S. W.
48	<i>2</i>	37	17	26	23	2	9	11	9	10	8	2.82	1.60	.....	9	.....	W.
41	<i>j</i>	45	22	35	28	6	<i>bb</i>	11	11	8	13	3.10	1.65	.....	9	.....	N. W.
40	2	50	23	39	15	5	8	4	22	4	10	3.35	2.05	.....	9	.....	.....
36	2	48	23	42	23	4	9	11	10.6	8.2	9.0	3.75	2.32	.....	8-9	.....	.....
42	2	37	19	30	28	6	9	11	11	8	12	4.45	1.91	.....	9	.....	S.
36	2	48	23	36	28	9	<i>ag</i>	7	13	10	11	4.55	2.15	.....	9	.....	S. W.
36	2	53	26	12	28	6	<i>af</i>	15	9	6	9	4.25	2.08	.....	9	.....	N. W.
44	<i>bf</i>	45	24	36	15	7	9	14	11	5	12	4.55	2.14	.....	9	.....	N. W.
43	22	45	20	35	23	6	9	10	15	5	7	2.84	1.38	23.30	9	.....	N. W.
46	<i>k</i>	44	22	33	21	5	9	.....	.....	.....	8	3.20	1.40	.....	10	.....	N.
43	28	46	21	35	28	4	9	13	5	12	7	3.23	2.32	.....	8-9	.....	.....
36	1	49	20	40	18	6	<i>af</i>	19.7	3.3	7.0	8.2	5.03	2.08	.....	3	.....	.....
40	2	46	18	31	28	8	9	18	2	10	9	5.45	1.49	15.00	29-30	.....	W.
44	22	46	19	25	24	8	9	25	1	4	7	6.31	2.08	.....	3	.....	W.
39	2	47	18	31	28	6	<i>af</i>	16	7	7	8	3.50	1.54	.....	9	.....	W.
36	1	56	25	40	18	9	<i>af</i>	.....	.....	.....	9	4.87	1.15	.....	29	.....	.....
37	2	47	21	35	28	4	<i>bc</i>	7.5	10.5	12.0	10.7	5.00	2.11	.....	8-9	.....	.....
39	2	44	17	28	<i>y</i>	4	10	.....	.....	.....	9	3.90	1.10	.....	10	.....	S. W.
37	2	49	23	35	28	5	9	5	11	14	10	6.21	2.11	.....	8-9	.....	S. W.
37	2	49	22	32	2	4	9	10	10	10	13	4.90	2.05	24.00	9	.....	S.
30	2	47	21	33	2	4	9	6.7	14.6	8.7	7.5	2.08	0.87	.....	3	.....	.....
36	2	49	23	32	18	12	30	.....	.....	.....	5	1.03	0.52	.....	10	.....	S. W.
30	2	58	25	38	2	8	9	7	15	8	8	2.50	0.87	.....	3	.....	S. W.
46	<i>m</i>	42	17	28	<i>z</i>	4	9	0	14	16	10	2.92	0.82	.....	3	.....	S.
42	2	38	18	26	15	7	9	13	15	2	7	1.88	0.45	11.00	30	.....	S. W.
35	2	50	25	43	24	5	9	10	11	9	6	2.70	1.00	.....	3	.....	S. W.
37	2	45	19	35	<i>aa</i>	2	4	11.7	10.1	8.2	9.0	2.66	1.51	.....	29	.....	.....
38	1	47	20	33	25	9	<i>af</i>	22	2	6	4	1.80	0.73	.....	29	.....	S. W.
44	21	33	13	26	2	2	4	8	6	16	8	1.95	0.84	.....	29	.....	S. W.
40	2	47	21	35	22	7	9	6	12	12	11	3.18	0.54	.....	29	.....	N. W.
41	2	45	20	30	22	6	9	11	11	8	11	2.62	0.60	.....	29	.....	S. W.
38	2	50	22	34	23	9	9	8	14	3	8	1.65	0.76	.....	29-30	.....	W.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	2.15	0.85	.....	7	.....	S.
40	2	48	22	31	<i>ab</i>	5	9	18	6	6	8	3.23	1.51	.....	29	.....	.....
42	2	43	19	27	23	8	9	7	20	3	8	1.79	0.80	.....	29-30	.....	N. W.
42	1	43	15	26	23	5	9	9	10	11	11	3.56	0.92	.....	24	.....	W.
37	2	52	23	35	<i>ac</i>	6	9	18	7	5	11	4.07	1.18	.....	29-30	.....	S. W.
41	2	41	19	29	23	5	9	12	11	7	11	2.95	1.07	.....	29	.....	N. W.
42	2	39	14	28	2	7	4	10	12	8	11	3.01	1.09	.....	7	.....	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
<i>Central Lakes.....</i>		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.0	91	24
<i>Fleming</i>	<i>Cayuga.....</i>	<i>1000</i>	.....	.....	.....	.....	.....	.....	.....	.....	62.4	62.0	87	24
<i>Watkins</i>	<i>Schuyler.....</i>	.....	.....	.....	.....	.....	.....	.....	77	55	.....	62.0	90	24
<i>Romulus.....</i>	<i>Seneca.....</i>	<i>719</i>	.....	.....	.....	.....	.....	.....	81	52	.....	62.9	91	24
<i>Ithaca</i>	<i>Tompkins....</i>	<i>810</i>	29.94	30.20	2	29.63	13	0.57	70	51	61.4	60.9	85	24
Mean.. .....		.....	29.95	30.27	7	29.63	13	0.51	72	52	.....	61.6	93	f

* Mean of the tri-daily observations. † Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4, four hours. (1) Voluntary Observer. (2) U. S. Weather Bureau. (1a) City Reservoir; (2a) (a) 17, 19; (b) 24, 28; (c) 24, 25; (d) 23, 24; (e) 25, 30; (f) 24, 30; (g) 2, 21; (h) 1, 2, 22, 27, 28; (j) (t) 22, 23, 28; (u) 19, 22, 28; (v) 20, 28, 30; (w) 2, 15; (x) 20, 23; (y) 5, 23; (z) 18, 19; (aa) 19, 22, (bd) 4, 9; (lf) 1, 2.

FOR JUNE, 1897 — (*Concluded*).

TURE—(IN DEGREES FAHR.).										SKY.		PRECIPITATION—(INCHES).						Prevailing direction of wind.	
Lowest.	Date.	Monthly range.		Mean daily range.		Greatest daily range.		Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.		Date.	Total snowfall
38	21	48	21	37	28	5	<i>af</i>	7.8	13.5	8.7	11.5	3.06	1.63	<i>h. m</i> 16.00	29-30	.....	.....	.....	.....
41	21	46	18	29	22	6	9	8	23	5	8	3.96	0.87	1.00	24	.....	.....	.....	<i>S.</i>
38	21	52	23	37	28	7	9	7	10	13	16	2.04	0.72	.....	29-30	.....	.....	.....	N. W.
41	2	50	23	35	24	6	9	12	8	10	9	2.71	0.66	.....	30	.....	.....	.....	<i>S.</i>
39	2	46	20	33	28	5	<i>af</i>	10	13	7	13	3.54	1.36	16.00	29-30	.....	.....	.....	N. W.
29	2	48	21	48	<i>ad</i>	2	<i>bd</i>	11.2	10.6	8.2	9.7	3.59	2.59	.....	9	.....	.....	.....	N. W.

Thermograph || Report received too late to be used in computing means. The means from the + Blank indicates that the duration is not shown in the original records, but is within twenty-Intake Conduit nine miles north of city.

21, 27; (*k*) 2, 21, 22, 27; (*m*) 1 2, 21; (*n*) 2, 23; (*p*) 2, 6, 11; (*q*) 2, 22; (*r*) 15, 28; (*s*) 21, 23, 28; 23; (*ab*) 6, 19; (*ac*) 19, 23; (*ad*) 3, 28; (*af*) 8, 9; (*ag*) 7, 8; (*ah*) 8, 22; (*bb*) 7, 8, 9; (*bc*) 9, 10;

TEMPERATURE — JUNE, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	48	54	67	63	58	60	59	51	56	59	60	62	63	62
Alfred.....	46	70	78	72	68	73	60	54	56	66	71	67	70	72
Angelica.....	36	24	57	52	40	41	52	49	50	49	45	55	53	46
	54	71	80	72	72	75	67	56	58	66	74	69	72	74
Bolivar.....	37	32	58	47	40	38	33	51	54	49	42	48	50	48
	55	73	81	75	70	76	64	59	69	65	73	71	72	75
Friendship.....	33	50	57	53	38	37	50	49	52	51	43	55	49	42
	60	79	81	75	74	78	61	62	61	73	75	72	78	76
Franklinville.....	38	23	54	53	39	38	48	50	59	40	45	55	52	45
	53	74	78	71	70	75	64	57	60	64	71	69	71	74
	38	35	56	56	41	40	48	52	53	52	42	53	53	42
Humphrey.....	52	71	76	69	68	73	63	55	56	62	70	67	69	72
	40	37	62	52	45	45	51	52	52	51	42	52	52	48
‡Arkwright.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jamestown.....	56	75	77	71	69	75	64	59	62	73	69	68	72	75
	40	37	59	55	49	46	54	53	53	54	46	54	56	50
Elmira.....	61	73	80	79	76	87	72	60	64	65	77	77	81	80
	42	50	59	58	56	63	60	50	56	52	46	59	60	51
Avon.....	69	73	81	70	75	82	73	65	63	71	78	71	76	77
	42	34	33	45	48	45	54	42	53	51	46	52	50	50
Lockport.....	66	73	78	71	79	83	72	63	60	71	82	78	78	81
	44	40	53	56	48	50	57	48	49	52	49	51	57	52
Wedgewood.....	56	71	80	77	77	77	66	54	59	63	80	64	80	78
	40	38	56	54	46	50	53	48	51	50	49	57	55	52
Addison.....	57	73	83	78	72	75	65	57	61	68	75	73	72	76
	38	35	58	58	47	44	49	50	53	52	45	55	52	47
South Canisteo.....	56	71	83	76	71	75	64	58	62	66	76	73	70	76
	35	32	55	54	39	41	48	47	49	49	40	56	48	42
Arcade.....	54	71	76	66	69	76	63	59	57	64	75	62	71	71
	42	36	57	50	46	46	53	51	52	51	43	53	54	48
<i>Eastern Plateau...</i>	50	53	65	63	60	59	59	54	54	57	62	65	62	61
Binghamton (1)....	54	71	81	82	72	77	63	56	60	68	76	70	73	72
	39	37	53	56	54	45	55	51	53	53	46	56	50	48
Binghamton (2)....	54	72	82	80	67	75	64	56	58	64	75	69	73	73
	42	41	59	57	52	44	54	51	52	53	47	57	52	52
Oxford.....	61	65	82	82	72	78	67	58	57	66	78	78	79	80
	38	32	40	55	40	45	49	48	47	49	43	54	45	45
Cortland.....	58	71	80	76	69	74	74	57	57	63	73	72	73	70
	42	35	54	57	48	41	51	48	51	50	42	55	48	48
South Kortright....	72	71	81	82	71	73	67	65	56	62	76	73	72	72
	43	33	42	53	44	39	50	42	43	46	50	52	42	41
Middletown.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Port Jervis.....	61	70	78	83	74	75	60	60	57	66	74	79	77	78
	42	42	51	64	55	48	55	55	49	50	54	57	55	56
Cooperstown.....	50	63	78	78	64	70	65	57	54	61	72	68	72	70
	44	38	50	56	52	45	55	52	50	50	52	55	52	50
Garrattsville.....	61	58	66	67	63	56	58	62	65	63	80	79	72	71
	44	46	49	41	45	43	48	44	42	50	59	57	49	46
New Lisbon.....	53	67	78	78	65	75	66	57	54	62	75	70	73	73
	37	29	44	53	46	37	49	49	46	50	46	59	42	43
Oneonta.....	56	71	83	86	72	81	72	62	58	67	79	73	79	75
	41	35	47	57	51	44	52	59	47	50	49	56	46	47
Perry City.....	58	68	82	76	74	77	71	60	60	66	77	72	75	74
	40	35	44	55	44	42	50	49	52	52	43	55	47	50
Straits Corners.....	53	67	80	82	72	75	68	54	59	56	79	75	77	75
	37	35	55	55	50	42	50	46	51	51	43	55	49	49
Waverly.....	57	74	81	80	74	80	70	56	61	66	76	78	71	79
	37	34	56	60	54	44	50	52	52	53	45	58	52	48
Dryden.....	...	70	81	81	70	79	70	57	60	62	76	69	73	71
	33	...	56	55	49	43	54	50	53	51	42	55	47	45
Mohonk Lake.....	68	68	72	79	69	70	61	55	55	65	70	76	71	71
	51	57	53	64	55	55	52	49	46	51	55	62	53	56

REGIONS AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean
67	63	56	63	63	56	49	58	66	71	67	57	57	55	65	71	60.5
78	74	57	72	76	64	58	72	81	82	75	64	69	75	74	76	58.4
54	48	44	46	46	43	39	39	56	60	57	45	41	42	50	64	59.1
80	78	62	72	78	64	63	74	84	86	76	65	70	76	74	77	59.0
44	50	45	48	54	42	31	35	43	58	59	51	39	40	52	64	60.3
81	75	62	74	80	67	64	75	82	85	80	66	70	71	76	80	58.9
54	48	47	50	40	50	31	34	41	55	59	44	34	37	52	66	59.4
81	77	60	83	81	69	68	80	84	83	79	72	70	78	76	83	59.4
54	46	46	50	42	42	32	37	42	46	53	54	40	44	50	58	59.4
78	75	61	74	78	62	61	75	82	84	76	65	71	75	75	76	59.4
53	43	41	52	42	55	30	38	43	58	57	47	35	38	55	67	59.4
76	74	60	74	76	66	59	73	79	82	78	64	70	75	73	75	59.4
56	53	53	51	51	42	36	41	54	64	57	54	40	45	57	55	59.4
76	75	66	74	79	70	60	74	82	86	75	66	70	71	75	80	60.2
56	59	56	56	50	51	40	43	53	65	61	52	42	45	59	68	61.8
82	72	65	79	81	71	71	79	78	86	81	70	82	83	76	80	65.2
63	61	53	53	46	53	40	43	58	65	64	53	56	43	57	70	62.1
79	70	80	79	82	67	65	82	89	93	79	68	74	78	83	80	62.1
54	48	48	58	60	42	38	54	64	58	60	39	40	41	54	64	62.1
82	78	84	78	84	.....	.....	58	64	68	65	66	76	61	82	78	61.6
57	51	53	50	52	.....	.....	43	39	42	44	44	46	41	60	62	61.9
84	79	64	70	80	68	68	79	84	87	83	70	78	87	76	72	61.0
57	50	48	50	48	45	38	44	56	63	57	48	44	46	54	59	61.0
82	75	60	76	79	67	66	77	85	86	80	68	72	79	75	79	61.0
54	51	47	52	43	48	35	38	47	61	59	48	40	42	55	67	58.7
81	76	58	75	81	64	69	75	84	86	79	67	71	78	76	79	58.7
50	44	42	49	41	41	30	85	43	58	50	45	36	36	50	62	59.2
77	73	69	71	78	66	58	75	82	85	76	62	69	73	78	74	59.2
54	48	42	49	45	44	33	40	53	62	57	46	39	41	56	65	59.2
63	61	58	62	62	59	53	58	65	74	71	58	56	59	62	63	60.5
79	72	67	74	79	67	65	75	83	85	79	65	69	77	79	75	61.0
48	48	45	53	45	47	38	39	51	65	62	50	38	46	55	65	61.0
79	73	66	73	78	68	64	74	82	85	80	64	70	77	77	73	61.0
50	50	46	51	47	46	41	42	53	66	60	49	41	40	53	62	60.6
82	82	72	79	84	72	72	77	85	91	88	76	79	82	76	78	60.6
43	45	45	49	41	54	35	34	42	62	61	44	38	34	46	60	59.8
86	70	67	73	78	72	64	75	83	85	78	67	70	77	70	70	59.8
47	43	43	47	43	50	39	39	50	64	63	50	41	28	49	61	58.6
77	73	71	76	80	54	65	76	84	87	83	73	71	77	76	80	58.6
37	41	38	43	42	47	32	34	43	62	63	45	37	33	42	60	58.6
82	79	73	80	81	75	79	73	83	85	86	72	76	77	80	82	63.8
50	52	49	54	39	60	44	42	48	61	67	55	42	42	58	60	59.5
72	70	74	70	76	68	61	71	80	85	76	64	65	74	67	72	58.0
50	52	54	50	55	49	40	48	52	65	60	52	47	42	52	58	57.2
75	69	72	71	75	68	62	75	79	83	79	66	65	75	76	71	61.7
44	45	44	43	46	45	37	41	51	64	52	46	42	39	47	59	60.0
70	71	70	74	77	67	64	72	80	84	80	62	69	76	71	76	60.2
46	42	40	47	41	42	32	34	41	64	56	40	39	32	42	59	62.0
76	75	75	80	82	71	70	79	87	88	83	71	71	80	76	78	61.7
44	46	43	50	45	50	45	38	46	65	62	49	42	38	47	60	60.0
89	72	74	80	81	69	68	78	87	83	78	66	73	79	76	73	60.2
48	47	41	43	42	36	38	47	62	58	45	41	39	47	60	61	62.0
81	84	63	74	70	80	70	77	82	86	83	69	72	81	83	75	62.0
47	46	43	51	43	42	38	37	38	62	58	45	37	39	53	61	60.6
78	75	62	80	80	70	68	75	83	85	85	72	75	83	79	84	63.4
50	48	45	55	43	48	34	37	47	65	61	47	36	39	39	69	63.4
79	72	75	73	82	67	69	75	84	87	78	63	69	76	78	71	60.6
46	43	42	48	45	50	37	38	55	65	51	43	39	39	50	60	63.4
75	75	68	74	75	72	66	68	76	79	82	69	74	72	72	80	63.4
58	61	57	55	58	51	47	62	58	63	63	56	53	53	56	59	63.4

TEMPERATURE—JUNE, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau...</i>	46	50	58	63	67	59	59	55	54	56	59	61	58	59
<i>Saranac Lake.....</i>	53	60	68	76	70	79	72	62	56	65	76	70	66	66
<i>Gloversville.....</i>	39	47	56	47	41	50	49	51	49	50	53	49	47	44
<i>Little Falls (2a)....</i>	54	68	70	79	70	75	62	55	55	65	75	70	73	73
<i>North Lake.....</i>	45	38	45	50	51	46	51	49	48	50	50	58	50	48
<i>Lowville.....</i>	54	71	71	77	72	76	64	57	52	61	74	71	73	75
<i>Number Four.....</i>	35	43	50	50	41	48	50	48	48	46	46	40	46	45
<i>Atlantic Coast.....</i>	55	49	64	60	70	65	71	73	69	59	59	72	66	71
<i>Brooklyn.....</i>	40	33	41	54	46	41	49	49	50	49	45	55	43	44
<i>Manhattan Beach..</i>	56	63	73	68	70	76	70	58	58	62	74	58	74	71
<i>New York City.....</i>	42	35	45	55	48	40	48	51	52	50	47	55	48	48
<i>Willet's Point.....</i>	50	59	68	66	65	72	70	55	56	60	72	65	69	69
<i>Brentwood.....</i>	40	29	44	52	44	45	54	49	50	50	42	54	42	42
<i>Setauket.....</i>	51	58	64	72	66	62	57	55	55	60	67	70	66	66
<i>Bedford.....</i>	65	72	77	85	75	70	67	59	59	70	80	80	79	84
<i>Primrose.....</i>	50	49	55	62	60	59	55	53	51	54	58	62	63	63
<i>Hudson Valley.....</i>	59	67	74	81	73	63	58	56	57	66	77	81	71	77
<i>Albany.....</i>	48	48	56	64	58	55	53	51	52	54	58	62	61	58
<i>Honeymead Brook..</i>	63	73	72	85	73	68	63	59	59	68	80	84	76	78
<i>Poughkeepsie.....</i>	47	53	58	59	57	55	52	54	55	55	55	59	54	54
<i>Wappingers Falls...</i>	62	74	72	80	80	69	62	60	60	76	78	82	79	80
<i>Catskill.....</i>	41	36	54	60	56	55	49	50	53	48	53	54	53	52
<i>West Point.....</i>	63	70	71	83	72	65	61	57	55	65	76	80	74	75
<i>Carmel.....</i>	49	50	54	62	58	56	53	51	52	53	55	60	57	54
<i>Mohawk Valley.....</i>	62	70	72	80	73	69	59	56	57	68	77	80	75	76
<i>Little Falls (1a)....</i>	43	43	50	62	57	52	53	50	51	52	54	56	54	50
<i>Plattsburgh Barracks.</i>	63	73	77	88	73	72	63	57	59	68	81	84	80	78
<i>Glens Falls.....</i>	45	40	48	61	58	54	55	52	52	50	54	56	54	51
<i>Lake George.....</i>	54	56	65	72	66	61	60	56	53	59	65	70	67	62
<i>St. Lawrence Valley.</i>	56	71	76	83	73	77	65	65	57	67	79	76	78	73
<i>Madison Barracks..</i>	49	48	52	61	56	55	57	52	51	54	56	61	56	54
<i>Watertown.....</i>	59	67	76	83	70	72	63	58	54	66	74	83	78	73
<i>St. Johnsville.....</i>	41	36	54	61	50	48	54	49	44	52	55	56	50	47
<i>Rome.....</i>	63	74	79	85	74	77	64	59	56	68	78	83	77	75
<i>Champlain Valley..</i>	39	26	50	64	57	47	53	53	50	52	54	57	50	46
<i>Plattsburgh Barracks.</i>	65	75	82	86	77	77	67	60	57	67	77	87	80	77
<i>Glens Falls.....</i>	44	44	53	54	56	52	55	52	50	52	50	62	55	52
<i>Lake George.....</i>	57	70	72	80	72	72	65	60	56	61	75	73	74	72
<i>St. Lawrence Valley.</i>	45	44	54	65	58	52	55	52	50	53	57	58	55	52
<i>Madison Barracks..</i>	75	62	76	78	84	76	74	62	56	62	68	82	84	76
<i>Watertown.....</i>	47	46	53	58	58	52	55	52	51	52	55	60	58	52
<i>St. Johnsville.....</i>	69	71	75	86	72	77	63	60	57	65	77	81	79	78
<i>Rome.....</i>	49	45	52	58	60	56	49	50	53	51	59	59	60	48
<i>Champlain Valley..</i>	50	54	60	65	60	62	63	56	53	57	63	63	60	62
<i>Little Falls (1a)....</i>	59	53	64	75	75	68	72	64	56	57	65	70	63	71
<i>Canajoharie.....</i>	44	40	49	49	50	47	56	50	48	48	50	56	50	51
<i>St. Johnsville.....</i>	58	66	74	82	69	71	67	67	58	65	75	70	74	75
<i>Rome.....</i>	47	52	49	60	50	61	57	53	50	54	55	59	50	53
<i>Champlain Valley..</i>	53	64	73	76	67	72	70	57	55	65	72	69	71	71
<i>Little Falls (1a)....</i>	46	39	49	61	52	46	56	51	49	53	52	58	49	51
<i>Canajoharie.....</i>	58	69	74	72	75	78	75	58	58	65	75	74	76	79
<i>Rome.....</i>	36	48	52	48	45	54	52	49	49	48	57	47	48	45
<i>Champlain Valley..</i>	53	52	60	67	64	62	61	57	54	56	60	67	62	60
<i>Plattsburgh Barracks.</i>	68	60	67	65	81	68	74	68	62	55	64	74	72	66
<i>Glens Falls.....</i>	48	39	49	48	53	48	51	51	52	51	50	54	58	55
<i>Lake George.....</i>	55	70	75	84	76	78	70	65	55	65	76	77	75	74
<i>St. Lawrence Valley.</i>	43	37	48	62	56	49	57	50	50	50	50	60	50	47
<i>Madison Barracks..</i>	60	69	71	80	72	77	65	60	55	62	72	76	70	73
<i>Watertown.....</i>	44	37	49	61	45	49	47	50	51	52	49	58	49	48
<i>St. Lawrence Valley.</i>	52	50	58	57	59	61	66	60	55	60	61	63	60	61
<i>Madison Barracks..</i>	63	58	65	70	70	72	75	75	63	67	69	71	68	69
<i>Watertown.....</i>	43	36	48	40	48	44	55	50	39	52	41	41	43	45

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
57	57	58	59	63	56	49	55	62	71	67	56	53	59	58	62	58.1
70	70	70	74	80	58	57	72	82	88	80	63	67	70	73	66	58.4
45	40	40	42	53	37	40	45	61	64	50	40	43	47	51	57	
73	75	73	79	79	67	63	74	84	84	81	68	69	75	70	77	60.1
44	50	44	52	46	48	43	40	46	62	60	50	42	50	45	55	
74	72	75	78	80	63	62	74	82	83	74	66	69	74	70	69	60.4
44	44	52	45	60	41	37	44	46	62	50	48	39	45	55	60	
67	68	66	71	70	74	58	57	56	68	82	75	61	....	69	66	55.5
42	43	42	45	43	56	36	35	32	47	61	46	39	....	44	52	
71	69	74	72	78	72	59	71	82	86	76	63	68	75	68	68	58.8
45	45	45	42	45	51	42	44	44	65	60	49	42	46	47	55	
68	68	69	70	74	57	57	68	78	82	74	60	64	70	65	62	55.2
40	38	40	42	42	47	33	38	53	65	56	44	34	37	42	55	
68	69	65	69	68	67	60	62	67	72	77	66	63	64	69	77	65.2
82	83	75	81	81	76	79	77	80	90	91	78	79	89	83	90	68.1
68	60	62	60	58	62	51	54	59	63	66	60	55	56	55	76	
80	80	70	77	77	73	68	75	73	78	86	72	72	74	80	85	65.0
59	61	62	57	62	57	50	57	59	64	66	58	56	60	63	67	
84	81	73	80	80	77	71	73	76	80	87	75	76	78	82	88	65.8
56	57	59	58	60	50	50	53	61	66	63	51	52	57	63	61	
82	83	80	84	76	77	74	74	75	78	90	78	79	76	79	93	64.0
44	48	53	58	50	60	46	39	46	65	65	57	47	41	52	67	
79	78	73	77	78	74	70	72	76	80	85	73	73	78	77	82	64.7
56	58	58	59	56	58	51	48	56	63	67	62	56	52	59	66	
79	79	70	79	79	76	69	70	76	80	86	73	72	77	79	86	52.6
51	52	49	54	51	57	41	42	49	59	65	55	41	42	55	63	
88	83	78	80	85	78	73	80	82	85	90	78	76	80	86	90	66.0
49	56	50	56	62	58	51	52	66	68	65	55	43	42	57	68	
66	66	63	66	68	67	59	60	67	74	77	65	59	63	68	73	64.3
75	78	74	81	80	73	68	75	83	85	85	72	72	81	74	79	65.0
54	54	52	58	55	52	48	50	56	68	65	53	50	51	54	62	
80	76	75	76	77	74	68	71	80	84	84	73	72	78	78	83	62.0
48	47	47	50	50	55	41	41	48	68	67	52	41	42	53	62	
82	80	72	78	82	77	72	74	82	86	89	75	75	82	79	88	63.0
46	45	45	51	48	57	39	39	48	61	67	50	39	40	53	60	
87	80	77	81	87	79	73	77	88	88	89	72	75	82	83	88	65.8
51	55	51	56	58	59	45	47	57	62	67	55	45	47	60	61	
73	77	71	74	79	75	70	74	81	84	88	74	73	81	73	84	63.0
53	54	51	51	54	55	46	43	52	62	69	55	50	46	52	59	
78	85	83	74	82	82	79	72	75	80	84	90	76	77	84	84	65.6
55	55	54	56	56	58	46	46	54	60	67	61	46	49	60	65	
83	81	76	78	83	76	70	78	84	83	89	73	72	81	81	86	65.8
54	57	53	55	60	59	61	52	47	63	66	51	44	43	62	64	
63	62	61	64	65	61	54	59	67	74	71	62	59	59	60	62	61.1
72	70	71	72	73	79	64	60	74	81	86	77	64	66	68	61	59.1
53	52	47	53	50	48	45	46	43	66	64	51	43	46	51	51	
75	74	76	76	82	69	59	76	85	90	80	71	71	68	70	73	62.8
59	51	50	56	51	54	45	44	52	55	65	58	55	47	52	61	
70	71	71	73	77	68	62	72	80	86	77	65	67	73	66	69	60.2
51	50	45	54	48	58	44	43	51	60	62	53	50	42	47	57	
80	79	75	84	84	76	70	78	86	92	85	75	75	80	68	70	62.2
46	47	50	44	58	43	41	50	67	62	52	48	44	48	55	56	
61	64	61	63	64	63	54	59	65	73	75	63	56	64	63	67	61.7
67	77	72	68	76	75	61	62	80	76	83	64	70	78	70	77	61.6
59	57	53	48	53	60	45	52	52	62	68	56	47	55	56	58	
66	75	76	80	80	70	67	72	83	86	86	70	70	82	72	79	62.1
50	48	46	52	49	48	39	44	50	64	64	50	40	47	50	56	
72	78	73	80	75	72	71	77	77	82	86	70	73	81	70	80	61.4
51	49	47	52	51	50	40	46	50	62	68	49	42	51	52	57	
63	60	61	62	63	60	54	59	66	74	69	59	59	62	62	63	60.8
73	71	73	78	77	80	66	61	71	85	85	70	70	71	73	68	59.4
49	47	49	46	50	56	42	47	52	61	56	52	45	49	53	56	

TEMPERATURE — JUNE, 1897, SHOWING DAILY MEANS FOR
STATION

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence (con'd)</i>														
Canton	62	68	72	69	74	79	80	67	60	70	79	74	74	71
North Hammond...	39	39	48	51	48	46	51	51	52	51	50	64	49	43
Ogdensburg	60	62	62	62	66	74	76	64	58	66	70	70	72	76
|| Potsdam	46	46	50	48	48	50	56	54	54	54	56	58	52	56
	59	61	68	66	68	74	78	67	61	68	73	72	69	76
	43	42	51	52	53	50	57	56	54	54	53	54	52	55
	68	63	67	68	69	76	79	65	58	65	76	75	69	73
	42	35	47	53	49	48	58	50	53	52	63	60	47	51
<i>Great Lakes</i>	50	54	65	61	60	65	64	55	55	59	63	62	64	64
Westfield	52	73	79	70	71	78	79	57	61	68	73	73	75	78
Buffalo	38	41	58	55	49	53	55	48	52	53	53	51	55	53
	53	72	68	56	62	74	67	58	60	62	70	62	72	65
	45	46	56	54	52	58	57	48	51	54	56	56	58	58
Pittsford	53	59	79	70	72	78	72	68	60	68	76	71	74	75
	41	40	53	53	46	48	55	52	53	52	52	51	55	53
Rochester	58	70	77	65	71	80	70	59	59	70	75	71	75	77
	41	41	55	51	50	51	57	53	53	52	52	52	56	53
Appleton	59	58	76	69	75	81	71	60	56	71	76	74	75	78
	44	38	49	56	46	50	56	49	47	50	49	48	57	50
Fort Niagara	61	57	72	73	73	77	69	61	58	71	72	76	76	78
	44	42	42	55	48	55	56	48	48	51	52	51	51	55
Baldwinsville	61	71	78	70	71	80	75	69	59	68	78	73	76	77
	46	42	53	55	51	49	55	52	54	53	52	53	53	52
Ridgeway	59	66	73	70	72	77	70	59	59	70	73	74	75	76
	44	40	51	57	50	52	57	50	51	52	52	51	58	54
Oswego	51	59	76	69	70	77	71	58	57	58	70	61	65	63
	42	43	55	50	50	51	56	52	52	50	51	49	49	52
Palermo	58	65	79	68	74	79	72	60	59	65	76	70	74	75
	42	37	53	54	49	47	55	52	53	51	47	54	47	48
Lyons	58	68	80	71	70	78	70	62	60	67	78	71	75	75
	45	44	56	56	52	52	56	52	55	53	55	61	55	55
Erie, Pennsylvania.	53	70	76	61	68	75	68	57	60	66	72	69	70	73
	45	42	61	54	50	54	55	47	51	51	52	58	62	55
<i>Central Lakes</i>	50	55	67	65	59	62	63	55	56	58	63	64	63	63
Fleming	57	68	72	70	68	67	72	60	69	63	75	70	73	73
	44	41	56	57	50	53	57	51	54	51	52	57	54	53
Watkins	58	71	84	74	71	77	70	59	59	65	77	72	73	76
	42	39	57	58	46	47	52	51	52	52	46	57	53	49
Romulus	57	70	77	74	70	79	73	60	59	65	77	71	76	76
	43	41	55	55	49	49	54	51	53	53	51	56	53	52
Ithaca	54	69	78	75	69	75	69	56	58	62	76	70	73	73
	43	39	57	57	50	47	56	51	53	51	46	58	52	50
Mean	51	54	63	65	61	62	61	56	54	58	62	65	62	62

‡ Max. and Min. by the Draper Thermograph. § Received too late to be used in computing conduit, nine miles north of city.

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Concluded.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
78	76	75	75	78	68	62	72	82	88	74	68	72	76	73	73	60.5
46	42	41	43	45	45	39	46	52	64	61	45	40	47	50	58	
74	72	70	78	76	66	68	72	78	88	78	66	72	70	68	68	61.6
56	50	50	50	48	50	46	54	56	64	60	50	54	56	64	56	
78	72	70	73	75	65	64	70	80	80	75	68	70	74	69	70	61.6
52	52	54	54	52	52	46	49	55	65	59	55	49	50	54	56	
75	74	75	70	79	77	74	72	73	85	78	77	79	76	77	78	60.4
48	50	49	51	53	41	38	40	43	42	43	48	45	46	45	44	
66	62	64	63	66	58	54	61	70	76	66	60	59	62	66	69	62.1
78	74	70	75	77	68	63	70	84	85	85	70	71	72	80	80	63.2
60	57	59	50	57	57	43	48	57	68	52	52	49	49	60	67	
67	75	75	75	76	64	60	67	74	77	75	66	67	70	75	72	62.0
62	59	58	54	59	50	44	55	63	64	58	54	54	57	62	65	
78	70	76	76	81	65	65	77	85	87	77	66	71	75	75	75	61.9
55	51	54	52	49	48	43	42	54	66	56	49	47	49	56	53	
76	71	76	77	79	64	65	78	84	86	76	67	71	74	72	76	63.0
58	54	54	52	54	46	41	48	56	68	56	51	48	50	60	62	
80	75	68	78	71	65	66	77	86	88	74	69	73	74	72	79	61.6
55	47	50	47	48	53	45	47	52	66	58	54	45	46	59	60	
57	60	52	50	52	56	55	51	62	60	60	55	57	62	74	80	.....
77	72	80	77	84	67	66	79	88	90	79	69	73	79	71	75	63.4
56	53	51	53	53	50	44	49	58	68	59	52	48	50	55	60	
78	72	76	75	77	67	65	73	83	86	74	68	73	75	71	77	62.5
59	54	53	48	53	53	44	49	56	68	61	50	47	51	60	63	
67	64	74	71	77	62	57	71	84	85	70	62	65	69	66	68	60.0
55	51	51	54	54	52	49	47	58	64	54	54	50	50	56	55	
75	67	76	78	85	63	63	77	87	89	72	77	72	77	66	73	61.0
48	47	47	48	50	49	45	49	52	64	57	52	44	43	50	57	
77	71	75	74	80	65	65	68	84	88	78	68	70	75	71	74	62.8
57	53	51	53	54	51	45	47	55	66	56	53	50	48	57	61	
72	69	68	70	76	68	60	68	81	79	72	64	69	69	80	76	62.0
63	60	60	55	60	52	50	48	60	68	60	55	50	52	62	67	
66	63	61	62	66	61	53	61	70	76	70	58	58	62	64	68	62.0
78	69	74	72	80	72	65	76	85	87	75	63	68	76	71	70	62.0
56	54	51	53	54	50	43	47	59	68	61	52	48	49	57	61	
78	73	69	75	82	71	68	79	87	90	79	66	73	80	75	76	62.0
50	49	57	47	47	53	38	44	51	63	64	48	40	43	54	64	
82	80	76	78	83	76	66	78	85	91	81	68	74	79	75	73	62.9
52	54	50	48	52	50	42	48	56	56	59	51	48	47	55	63	
77	71	68	74	78	67	65	75	83	85	78	65	70	77	74	71	69.9
51	50	47	51	48	47	40	43	55	67	59	50	43	44	54	63	
64	63	61	63	65	61	54	59	66	74	71	60	58	61	64	68	61.6

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir; (2a) Intake

DAILY AND MONTHLY PRECIP

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	0.01	T.	0.14	T.	0.00	0.00	0.19	0.17	0.18	0.08	T.	0.00	0.09	T.
Alfred.....			.08				.28	.38	.18		T.		.02	
Angelica.....	T.		.18				.32	.46	.66	.12			.14	
Bolivar.....				T.			.38	.63	.18	.02	T.		.24	
Friendship.....	T.		.07	T.			.20	.48	.06	.01	T.		.28	
Franklinville.....	T.		.12				.23	.23	.10	.04			.17	
Humphrey.....	.25		.02				.10	.55	.28	.09			.53	
Little Valley.....														
Cherry Creek.....	T.		.12				.50	.56	.07	.04			.27	
Jamestown.....			T.	T.			.99	.26	.10	T.	.01		.08	
Elmira.....			.43					.36		.10				
Pine City.....	T.		.19	.01				.36	.20	.23			T.	
Akron.....	T.		.14	T.			.16	.50	.12	T.				
Avon.....	T.		.25	T.			.12	.44	.12	.24				
Mt. Morris.....			.05				.05	.60	.20	T.				
Lockport.....			.10	T.			*	+ .63	T.	.02				
Victor.....							.10		1.00					
Tyrone.....														
Wedgewood.....	.03		.35	.02				.48	.10	.15				
Addison.....	T.		.05	T.			.01	.70	.08	.11			.01	
Atlanta.....	T.		.21	.02				.41	.09	.13				
Haskinville.....		T.	.12				T.	.56	.13	.17			.05	
South Canisteo.....	T.		.20				T.	.90	.02	.12			.08	
Arcade.....	.01		.19				.35	.38	.09	.04			.03	T.
Attica.....														
<i>Eastern Plateau...</i>	0.01	0.00	0.50	0.22	0.01	0.00	T.	0.48	0.78	0.08	T.	0.00	T.	0.05
Binghamton (1).....			.03	1.05	.05			.20	.47	.18				.08
Binghamton (2).....	T.		.03	.76				.28	.38	.03				.02
Chemango Forks.....								.70						.50
Oxford.....			1.45	.05				.18	.84	.13				
Cortland.....	T.			T.				.61	.83	.03				.12
South Kortright.....			.58	1.21				*	*	+1.79				
Brookfield.....														
Middletown.....														
Port Jarvis.....	.05		.86	.03				1.45						.02
Warwick.....	.07			.21	.16			.22	2.20	.12				
Cooperstown.....	T.		.55					.75	2.50				T.	T.
Garrattsville.....							.03							
New Lisbon.....			.61					.25	1.44	.15				
Oneonta.....			1.31	.23				1.17	.94	.17				
†Schenevus.....														
Perry City.....	.09		.16	.02				.48	.14	.13				.08
Newark Valley.....	T.		.89					.24	1.10	T.				.07
Straits Corners.....	T.		1.00	T.				.36	.57	.12				.02
Waverly.....			1.50					.45	.38	.06			T.	
Dryden.....	.03		.09	.03				.34	.53	.10	T.			.07
Mohonk Lake.....				.28				*	*	+2.01				
<i>Northern Plateau...</i>	T.	0.03	1.00	0.03	T.	0.00	0.00	0.41	1.59	0.12	0.05	0.01	0.12	0.12
Saranac Lake.....	.02	.17	.34					*	+1.64	.02	.18	.04	.32	.21
Gloversville.....	T.		1.58	.10				.16	2.59	.20	T.	T.	.06	.04
Little Falls (2a).....	T.	.07	.96	.07	T.			1.30	.99	T.	.08	T.	.02	T.
North Lake.....			1.10					.63	.83				.12	
Lowville.....			.60					.31	1.16	.32		.06		.05
Number Four.....			.69						*	+1.78	.18		.18	.15
Kings Station.....			1.70	.06				.07	2.40	.18			.13	.40
<i>Atlantic Coast</i>	0.09	0.01	0.03	0.20	0.07	T.	T.	0.49	1.29	0.16	T.	T.	0.04	0.17
Brooklyn.....	.10		.09	.28	.06			.48	.26	.98		.91	T.	
Manhattan Beach.....														
New York City.....	.05		.09	.59	.07			.38	1.41	.01	T.		T.	
Willels Point.....	.15	.08		.10	T.			.75	.95					.05

TATION FOR JUNE, 1897 — (INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.01	0.01	0.68 .20	0.05	0.05 T.	0.07 .18	0.00	T.	0.05 .05	0.33 1.03	0.01	0.00	0.00	T.	0.40 .26	0.40 .31	2.64 2.97
.....68	.....	*	+ .12	.....	.....	.62	*	+1.48	.....	.....	T.	*	+ .78	5.56
.0103	.....	.12	.26	.....	.....	T. .20	.48	.....	.....	.....	.....	.51	.58	3.44
.....23	.....	T.	.22	.....	.....	.....	.60	.....	.....	.....	.....	.23	.35	2.98
.0315	.02	.....	.07	.....	.....	.....	.07	T.	.....	.....	.....	.40	.08	1.77
.0204	.....	.31	.....	.....	.....	.....	.07	.....	.....	.....	.....	.28	1.17	3.71
.02	T.	.07	.....	.08	.....	.....	T.	.....	.....	.....	.....	.....	.36	1.01	3.10
T.	.12	.06	.72	.....	.06	.....	.....	.....	.....	T.	.....	.....	.....	.05	.11	2.06
.....11	.....	.....	.....	.....	.59	.....	.....	.....	.....	.17	.....	1.76
T.09	.12	.08	.....	T.	.....	.42	.16	.....	.....	T.	.10	.32	2.28
.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.77	.10	1.79
T.34	.45	1.96
.....	T.	.....	.....	.....	.....	.40	.80	2.10
.....16	.....	.....	.....	.....	.62	.....	1.53
.....	.12	.....	.....	.....	.....	.....	.....	.02	.95	.....	.....	.....	.....	.85	.....	3.04
.0206	.....	T.	.06	.....	.....	T.	.44	.....	.....	.....	.....	.32	.70	2.74
.0403	.09	.08	.15	.....	.....	.....	.60	.02	.....	.....	.....	.13	.46	2.56
.....08	.....	.....	.06	.02	.....	.....	.....	.....	.27	.94	2.23
T.	T.	.....	.....	.....	.....	.....	.....	.10	.....	.....	.....	.....	.45	.30	1.88
.....22	.....	.32	.11	.....	.....	.11	.85	.....	.....	.....	.....	.52	.03	3.48
.....	T.	.....	.....	.....	T.	.22	.....	.....	.....	T.	.90	.37	2.64
.....
0.04	0.00	0.07 .22	0.05 .21	0.05 T.	0.03 .03	0.02 .01	0.00	T.	0.15 .08	0.03 .15	0.00	0.00	0.00	0.41 .15	0.59 .74	3.66 3.76
.1219	.18	T.	.01	.....	.....	.....	.09	.08	.....	.....	.....	.25	.61	2.93
.2530	.....	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.00	.....	2.90
T.10	.....	.....	.....	T.	.....	.....	.....	.....	.10	1.95	4.80
.....06	.....	.....	.....	.....	.....	.67	.17	.....	.....	.....	.30	1.02	3.81
.....24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....
.....
.04	T.	.....	.....	.16	.45	.....	.....	.....	.....	.....	.....	.....	.16	.10	3.24
.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.42	1.00	5.22
.....
.06	T.	.....	.....	.....	.....	.....	*	+2.35	2.44
T.10	.03	.....	.....	.....	.37	1.15	4.10
.....11	.....	.....	.....	.....	.03	.....	.....	.....	.....	1.35	.....	5.31
.....20	.....	1.73
.0302	.....	.27	.....	.....	.....	.....	.73	.03	.....	.....	.....	.69	1.31	4.18
.....
.0210	.12	T.	T.	.....	.....	.....	.24	.03	.....	.....	.....	.40	.60	3.81
.0722	.07	.01	.....	.....	.....	.....	.27	.04	.....	.....	.....	.26	.53	3.64
.0412	.05	.05	.05	.....	.....	.....	.27	.....	.....	.....	.....	.20	.05	2.22
.0403	T.	.17	.....	.....	.....	.36	.04	.....	.....	.....	.30	1.63	3.76
.....	T.	2.29
0.04	T.	0.00	0.00	0.50	0.16	T.	0.00	T.	0.01	T.	0.00	0.00	0.00	0.47	0.37	4.97
.0241	.02	.03	.....	.....	.....	.....	.....	.....	.....	.44	.01	3.75
.....	T.	.....	.....	.07	.40	.....	.....	.02	T.	T.	.....	.....	.....	.20	1.30	6.72
.....55	.....	.....	.....	.....	T.	.....	.....	.....	.....	1.30	.02	5.49
.....
.08	1.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.52	.....	4.50
.0977	.50	.....	.....	.....	.06	.....	.....	.....	.....	.11	.15	3.40
.0740	.22	.....	.....	.....	.....	.03	.....	.....	.....	*	+ .42	4.29
.....25	.75	6.63
0.02	0.00	T.	0.02	0.05	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	T.	0.12	3.00
T.	T.	T.	.....	.21	.....	.....	.....	.....	.....	.....	.....	.....	T.	.13	2.60
.....
T.	T.	T.	.....	.26	.....	.....	.....	.....	.....	.....	.....	.....	T.	.12	2.98
.0435	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	2.67

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan. Coast (Con.)</i>														
Brentwood.....	.10	.....	.....	.20	.....	.....	.....	.49	1.10	.....	.....	.....	.30	.80
Setauket.....	.06	.....	T.	T.	.27	T.	.....	.23	1.60	.04	.....	.....	T.	.06
Bedford.....	.10	.....	.....	.21	.03	T.	T.	.25	1.65	.05	.01	.....	.....	.23
Primrose.....	.10	.....	.06	.03	.05	T.	T.	.91	2.05	.02	.....	.....	T.	.02
<i>Hudson Valley.....</i>	T.	T.	0.02	0.21	0.08	T.	T.	0.17	1.71	0.22	0.13	T.	0.03	0.18
Albany.....	T.	.....	.15	.30	.07	.....	.....	T.	1.91	.04	T.	.01	.10	.23
Cedar Hill.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Honeymead Brook.....	.....	T.	T.	.11	.02	T.	T.	.10	2.15	.05	.....	.....	.13	.03
Poughkeepsie.....	.03	.....	.....	.06	.....	.....	.....	.69	2.08	.06	.....	.....	T.	.02
Wappinger's Falls.....	.....	.....	.02	.20	.....	.....	.02	.51	2.14	.20	.....	.....	T.	.21
Catskill.....	T.	.....	T.	.03	.....	.....	.....	.....	1.38	.....	.....	.....	T.	.22
West Point.....	T.	.....	.....	T.	.05	T.	.....	.....	1.10	1.40	.05	.....	.....	.....
Boyd's Corners.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carmel.....	T.	.....	.....	.....	T.	.....	.....	*	2.32	T.	.....	.....	.....	T.
Southeast Reserv'r.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eagle Mills.....	.....	.....	.....	1.00	.50	.....	.....	.....	1.20	.....	1.00	.....	.....	.75
Easton.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Mohawk Valley.....</i>	0.00	0.11	0.86	0.34	T.	0.00	0.00	0.46	1.33	0.29	0.03	0.02	T.	0.01
Little Falls (1a).....	.....	.....	.23	.75	.01	.....	.....	.....	1.41	.84	.....	.06	.....	.....
Canajoharie.....	.....	.....	2.08	.19	T.	.....	.....	.....	1.05	1.65	.10	.....	T.	.03
St. Johnsville.....	.....	.....	.22	.52	.....	.....	.....	.10	1.54	.20	.....	.04	.....	.....
Rome.....	.....	.45	.90	.....	.....	.....	.....	.70	.72	.03	.11	.....	.....	.....
<i>Champlain Valley.....</i>	T.	0.00	0.60	0.31	T.	0.00	0.00	0.01	1.40	0.53	0.08	0.08	0.19	0.23
Plattsburgh Barracks.....	.....	.....	T.	.44	.....	.....	.....	.....	.03	1.10	.25	.18	.30	.28
Glens Falls.....	T.	.....	1.30	.06	.....	.....	.....	.....	2.12	.21	.....	T.	.17	.07
Lake George.....	T.	.....	.50	.12	.01	.....	.....	.03	2.05	.28	.....	.05	.11	.34
<i>St. Lawrence Val.....</i>	0.01	?	0.56	0.00	0.00	0.00	0.00	0.17	0.15	0.22	0.00	0.22	0.05	T.
Madison Barracks.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.52	.....	.....	T.	.....
Watertown.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canton.....	.....	.....	.85	.....	.....	.....	.....	.26	.18	.15	.....	.27	.15	.....
<i>DeKalb Junction.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Hammond.....	.....	.....	.82	.....	.....	.....	.....	.20	.28	.....	.....	.24	.06	.....
Ogdensburg.....	.01	*	4.83	.....	.....	.....	.....	.11	*	4.09	.....	.36	T.	T.
Potsdam.....	.....	.....	1.00	.....	.....	.....	.....	*	*	4.58	.....	.25	.....	.05
<i>Great Lakes.....</i>	0.02	0.05	0.32	0.08	0.00	0.00	0.27	0.34	0.23	0.10	T.	0.02	0.02	T.
Westfield.....	.....	.....	.14	.....	.....	.....	.45	.48	.....	.....	.....	.....	.....	.....
Buffalo.....	.01	.....	.21	T.	.....	.....	.36	.34	.02	T.	T.	.....	.01	T.
Adams Centre.....	.....	.38	.....	.....	.....	.....	.03	.21	.76	.08	.....	.16	.....	.02
<i>Pittsford.....</i>	.01	.....	.49	.....	.....	.....	.33	.42	.41	.29	.....	.....	.....	.....
Rochester.....	.06	.....	.21	.....	.....	.....	.32	.42	.33	.28	.....	.....	.....	.....
Scottsville.....	.....	.....	.57	.....	.....	.....	.23	.40	.85	.28	.....	.....	.....	.....
Appleton.....	.05	.....	.19	.....	.....	.....	.39	.20	.03	.03	T.	.....	.....	.....
<i>Fort Niagara.....</i>	.....	.....	.28	.....	.....	.....	.85	.....	.10	.....	.....	.....	.....	.....
Niagara Falls.....	.05	.....	.23	.....	.....	.....	.40	.31	.....	.02	.....	.....	T.	.....
Baldwinsville.....	T.	.38	.02	.....	.....	.....	.23	.35	.35	.....	.....	.....	.....	.....
Skaneateles.....	.....	.....	.58	.....	.....	.....	.....	.28	.32	.24	.....	.....	.03	.04
<i>Lyndonville.....</i>	.....	.....	.25	.....	.....	.....	.10	.35	.08	.....	.....	.....	.....	.....
Ridgeway.....	.16	.....	.18	.....	.....	.....	.13	.38	.11	.03	.....	.....	T.	.....
Fulton.....	.....	.....	1.15	.41	.....	.....	.....	.50	.31	.....	.....	.....	.....	.....
<i>Oswego.....</i>	T.	.....	.77	.....	.....	.....	.....	.59	.09	.08	.....	.04	.....	.....
Palermo.....	T.	.....	.10	.72	.....	.....	.....	.40	.35	.15	.....	.10	.....	.....
Phoenix.....	.....	.....	.35	.34	.....	.....	.....	.23	.32	.37	T.	.....	.....	.....
<i>Lyons.....</i>	.....	.35	T.	.....	.....	.....	.41	.05	.13	T.	.....	.....	.24	.02
Rose.....	.01	.....	.50	.....	.....	.....	.....	.57	.02	.12	.....	.....	T.	.....
Erie, Pennsylvania.....	T.	.....	.09	.....	.....	.....	1.09	.41	.01	.....	.03	T.	.12	.....

STATION FOR JUNE — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
.10 T. .01 T.			.10 T. .05		.40 .43 .19 .04									T. T.	.13 .32 .07	3.50 2.82 3.10 3.35
0.03 .01 T. .01	0.00	0.02	0.03	0.01	0.18 T.	0.06	0.00	0.00	0.04 .34	T.	0.00	0.00	?	0.03 0.04	0.70 1.25	3.92 4.45
				.07		.35			T.				*	.04 + .83	1.50 4.25	4.55 4.25
.10 .03		.15 .02			.52 .06									.03 *	.45 +1.10 .20	4.55 2.84 3.20 3.41
.07 .94		T. .11			.22										.51 1.02	3.23 3.18 5.56
T. T. T.	0.02 .08	0.00	0.00	0.24 .20 .54	0.25 .58 .54	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.94 1.49 1.10 T. 1.15	0.08 6.31 3.50 4.87	5.03 5.45 6.31 3.50 4.87
0.35 .23 .70 .11	0.00	0.00	0.00	0.26 .79 T. .71	0.24 .71	0.00	0.00	0.00	0.00	0.26 .77	T.	0.00	0.00	0.10 T. .13 .17	0.47 .32 .66 .42	5.00 3.90 6.21 4.90
0.06 .03	0.00	0.00	0.00	0.06 .25	0.02	0.00	0.00	0.00	0.06 .10	0.00	0.00	0.00	0.00	0.29 *	0.42 + .13	2.08 1.03
									T.					.38	.24	2.50
.20 .20					.06				.16 .30					.20 * *	.60 + .45 + .52	2.92 1.88 2.70
0.02 .02 .18	0.01 T. T.	T. T. T.	0.02 T.	0.02	0.02	0.00	0.03	0.01	0.21 T. .03	0.01 T.	0.00	0.00	T.	0.68 .73 .84 .18	0.27 1.80 .16 .02	2.78 1.80 1.95 2.05
.10 T.		T. T.	T. T.	T. T. T.	.11 .63			T. T.	.30 .13	T. T.				.54 .60 .69 .73	.18 .23 .13 .03	3.18 2.62 3.15 1.65
				T.				.17 T.						.63 .69 1.51 .63	.12 1.70 3.23 .92	2.15 1.70 3.23 3.15
		T.		.22 .02	.04			.03	.04 .03					.82 .70 .89	.10 .10 .15	1.74 1.79 3.79
T.		T. T.	T. T.	.02 .10 .03	.08 .07 .10			.02	.92 * T.	T. + .90 .26				.55 * 1.07 1.11 .08	.40 +1.18 1.28	3.56 4.67 3.28
T. .33		T. T.		.07 .03 T.	.04 .02			.08 .09	.51 1.72 T.	T.				1.07 1.11 .08	.02 .54 .82	2.95 4.75 3.01

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.06	0.03	0.15	0.05	0.00	0.00	0.05	0.51	0.30	0.16	0.00	0.00	0.07	T.
Fleming .....			.34	.20				.70	*	†.45			T.	
Sherwood .....	.15	.14	.07				.23	.42	.23				.13	
Watkins .....	.03		.11	.01				.39	.04	.14			.03	T.
Romulus .....	.08		.18					.47	.61	.36				
Ithaca .....	.06		.07	.02			T.	.58	.34	.15			.20	
Average	0.02	0.02	0.42	0.13	0.02	T.	0.05	0.35	0.90	0.19	0.03	0.04	0.06	0.08

‡ Record for the month incomplete. || Received too late to be included in the averages.
 polated from values at other stations.

TATION FOR JUNE — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.03	0.00	0.02	T.	0.02	0.05	0.00	0.00	0.02	0.45	0.08	0.00	0.00	0.00	0.65	0.52	3.23
T.	.....	.....	.....	.....	.....	.....	.....	T.	.87	.25	.....	.....	.....	.70	.45	3.96
.12	.....	.07	.....	.11	.....	.....	.....	.10	.57	.....	.....	.....	.....	1.55	.01	3.90
.01	.....	.02	.01	.01	.05	.....	.....	.01	.46	.....	.....	.....	.....	.26	.46	2.04
.....	.....	T	.....	.....	.06	.....	.....	T.	.....	.16	.....	.....	.....	.13	.66	2.71
.01	.....	.02	.....	T.	.16	.....	.....	.....	.34	.....	.....	.....	.....	.59	1.04	3.54
0.06	T.	0.02	0.02	0.13	0.13	0.01	T.	0.01	0.13	0.04	T.	0.00	T.	0.40	0.39	3.63

*Amount included in next measurement.

† Not included in computing averages.

§ Inter-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE DEGREES (FAHR.).							EXTREMES OF MONTHLY MEAN TEMPERATURE FOR JUNE.			
		Normal for the month of June.	Length of record, years.	Record begins.	Record ends.	Mean for June, 1897.	Departure from the normal.		Highest.	Year.	Lowest.	Year.
<i>Western Plateau</i>		65.8	..	..	..	61.2	-4.6	..	..	..	..	..
Angelica	Allegany	61.5	16	1851	1897	59.1	-5.4	71.1	..	1856	59.1	1897
Humphrey	Cattaraugus	61.8	15	1883	1897	59.4	-5.4	67.7	'90	'95	59.4	1897
Elmira	Chemung	68.0	18	1852	1897	65.2	-2.8	73.2	..	1895	61.2	1859
<i>Eastern Plateau</i>		64.1	..	..	..	60.5	-3.6	..	..	..	..	..
Oxford	Chenango	63.9	30	1828	1897	60.6	-3.3	70.4	..	1828	57.9	1833
Cortland	Cortland	62.0	35	1829	1897	59.8	-2.2	66.5	..	1858	58.1	1851
Cooperstown	Otsego	61.0	44	1854	1897	59.5	-4.5	71.9	..	1870	57.3	1863
Waverly	Tioga	66.5	15	1883	1897	62.0	-4.5	71.2	..	1895	62.0	1897
<i>Northern Plateau</i>		63.0	..	..	..	58.8	-4.2	..	..	..	..	..
Lowville	Lewis	63.0	32	1827	1897	58.8	-4.2	69.4	..	1881	58.2	1857
<i>Atlantic Coast</i>		67.7	..	..	..	64.8	-2.9	..	..	..	..	..
New York City	New York	68.7	27	1871	1897	65.0	-3.7	72.0	..	1892	64.2	1881
Setauket	Suffolk	66.7	12	1886	1897	64.7	-2.0	69.8	..	1892	63.8	1886
<i>Hudson Valley</i>		68.3	..	..	..	61.2	-4.1	..	..	..	..	..
Albany	Albany	68.8	24	1874	1897	65.0	-3.8	73.0	..	1895	65.0	'78-'97
Honeymead Brook	Dutchess	66.5	17	1881	1897	62.0	-4.5	69.7	'82	'89	62.0	1897
West Point	Orange	69.5	68	1826	1897	65.6	-3.9	..	..	..	..	..
<i>Champlain Valley</i>		65.2	..	..	..	61.6	-3.6	..	..	..	..	..
Plattsburgh Barracks	Clinton	65.2	43	1839	1897	61.6	-3.6	72.4	..	1870	60.5	1842
<i>St. Lawrence Valley</i>		65.6	..	..	..	60.5	-5.1	..	..	..	..	..
Madison Barracks	Jefferson	64.8	36	1839	1897	59.4	-5.4	71.2	..	1870	59.2	1843
Canton	St. Lawrence	66.2	36	1862	1897	60.5	-5.7	73.9	..	1870	60.5	1897
North Hammond	"	67.1	20	1866	1897	61.6	-5.5	77.9	..	1870	61.6	1897
Potsdam	"	64.3	30	1828	1897	60.4	-3.9	69.4	..	1895	56.7	1833
<i>Great Lakes</i>		65.4	..	..	..	61.9	-3.5	..	..	..	..	..
Buffalo	Erie	64.8	27	1871	1897	62.0	-2.8	69.0	..	1895	59.6	1881
Rochester	Monroe	66.4	26	1871	1897	63.0	-3.4	71.0	'93	'97	61.0	1881
Fort Niagara	Niagara	65.3	39	1842	1896	..	..	69.7	'76	'81	59.1	1842
Baldwinsville	Onondaga	65.6	20	1854	1897	63.1	-2.2	72.0	..	1892	60.7	1857
Oswego	Oswego	63.8	27	1871	1897	60.0	-3.8	68.9	..	1876	58.2	1881
Palermo	"	65.3	41	1857	1897	61.0	-4.3	71.6	..	1870	61.0	1897
Erie, Pennsylvania	Erie	66.9	24	1874	1897	62.0	-4.9	71.0	..	1876	62.0	'81-'97
<i>Central Lakes</i>		66.6	..	..	..	60.9	-5.7	..	..	..	..	..
Ithaca	Tompkins	66.6	19	1879	1897	60.9	-5.7	70.4	..	1892	60.9	1897
Average departure .....		..	..	..	..	..	-4.1	..	..	..	..	..

AND PRECIPITATION — JUNE.

STATION.	COUNTY.	PRECIPITATION — (INCHES.)									
		Average for the month of June.	Length of record, years.	Record begins	Record ends.	Total for June, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR JUNE.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau</i>		4.41	.....	.....	.....	3.68	-0.73	.....	.....	.....	.....
Angelica	Allegany	4.42	15	1856	1897	5.56	+1.14	12.50	1857	2.02	1894
Humphrey	Cattaraugus	4.67	15	1883	1897	3.71	-0.96	8.85	1889	2.14	1887
Elmira	Chemung	4.15	18	1852	1897	1.76	-2.39	7.01	1857	1.76	1897
<i>Eastern Plateau</i>		4.02	.....	.....	.....	4.12	+0.10	.....	.....	.....	.....
Oxford	Chenango	4.06	27	1829	1897	4.80	+0.74	10.93	1855	1.63	1844
Cortland	Cortland	4.88	19	1851	1897	3.81	-1.07	12.55	1857	1.45	1853
Cooperstown	Otsego	4.14	44	1854	1897	5.52	+1.38	9.76	1855	0.95	1870
Port Jervis	Orange	3.66	13	1880	1897	3.24	-0.42	6.01	1892	1.39	1891
Waverly	Tioga	3.35	16	1882	1897	3.22	-0.13	7.31	1883	1.17	1888
<i>Northern Plateau</i>		3.34	.....	.....	.....	3.40	+0.06	.....	.....	.....	.....
Lowville	Lewis	3.34	25	1827	1897	3.40	+0.06	6.75	1835	0.19	1856
<i>Atlantic Coast</i>		2.99	.....	.....	.....	2.90	-0.09	.....	.....	.....	.....
New York City	New York	3.25	27	1871	1897	2.98	-0.27	7.70	1887	0.86	1894
Setauket	Suffolk	2.73	12	1886	1897	2.82	+0.09	6.57	1887	0.58	1893
<i>Hudson Valley</i>		3.29	.....	.....	.....	3.97	+0.68	.....	.....	.....	.....
Albany	Albany	3.64	24	1874	1897	4.45	+0.81	6.43	1889	1.72	1895
Honey-mead Brook	Dutchess	2.86	17	1881	1897	4.55	+1.69	4.80	1887	1.22	1884
Poughkeepsie	"	3.02	22	1830	1897	4.25	+1.23	4.78	1843	0.82	1832
West Point	Orange	3.50	50	1840	1897	3.20	-0.30	7.37	1848	0.76	1873
Boyd's Corners	Putnam	3.44	27	1870	1897	3.41	-0.03	7.70	1887	0.71	1873
<i>Champlain Valley</i>		2.95	.....	.....	.....	3.90	+0.95	.....	.....	.....	.....
Plattsburg Barracks	Clinton	2.95	37	1840	1897	3.90	+0.95	7.62	1892	1.27	1881
<i>St. Lawrence Valley</i>		2.91	.....	.....	.....	2.22	-0.69	.....	.....	.....	.....
Madison Barracks	Jefferson	2.37	37	1841	1897	1.03	-1.34	11.50	1889	0.88	1880
North Hammond	St. Lawrence	2.91	20	1866	1897	2.92	+0.01	8.74	1866	0.69	1895
Potsdam	"	3.45	28	1828	1897	2.70	-0.75	7.35	1889	1.52	1832
<i>Great Lakes</i>		3.21	.....	.....	.....	2.89	-0.32	.....	.....	.....	.....
Buffalo	Erie	3.24	27	1871	1897	1.95	-1.29	9.52	1892	1.24	1876
Rochester	Monroe	3.18	26	1871	1897	2.62	-0.56	6.68	1892	1.51	1887
Fort Niagara	Niagara	2.39	41	1842	1897	2.15	-0.24	7.25	1842	0.28	1864
Oswego	Oswego	3.39	27	1871	1897	3.56	+0.17	9.81	1889	1.03	1886
Palermo	"	3.12	38	1860	1887	4.07	+0.95	8.80	1865	0.70	1847
Erie, Pennsylvania	Erie	3.92	25	1873	1897	3.01	-0.91	6.84	1885	1.22	1891
<i>Central Lakes</i>		3.70	.....	.....	.....	3.54	-0.16	.....	.....	.....	.....
Ithaca	Tompkins	3.70	19	1879	1897	3.54	-0.16	7.54	1883	1.35	1884
Average departure							-0.06	.....	.....	.....	.....

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR JUNE, 1897





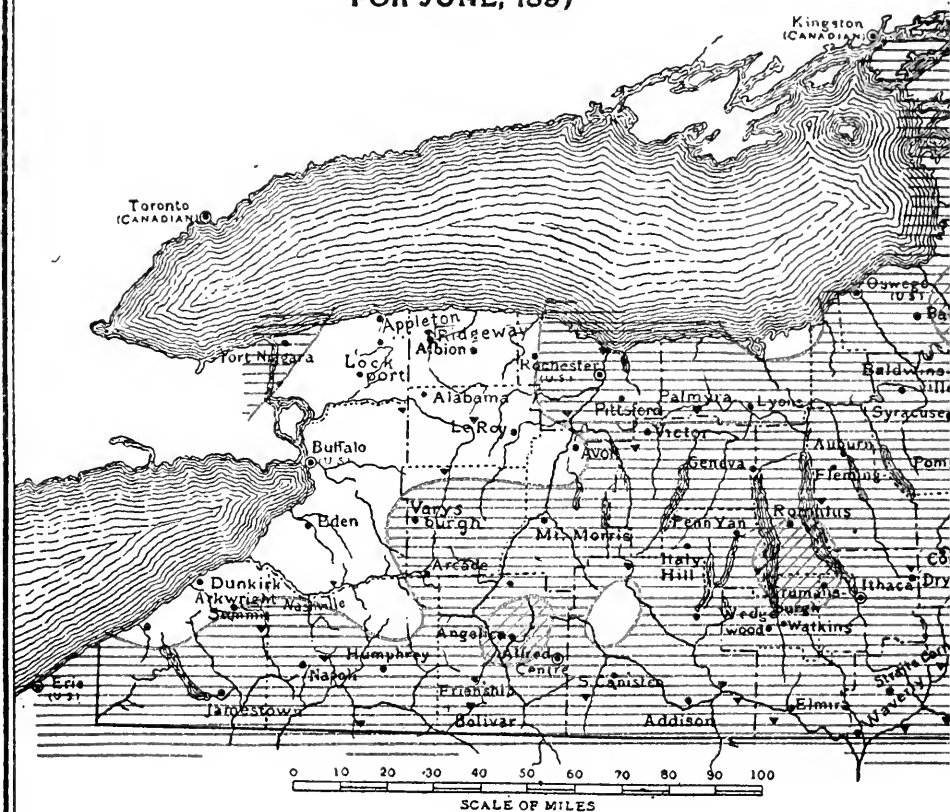


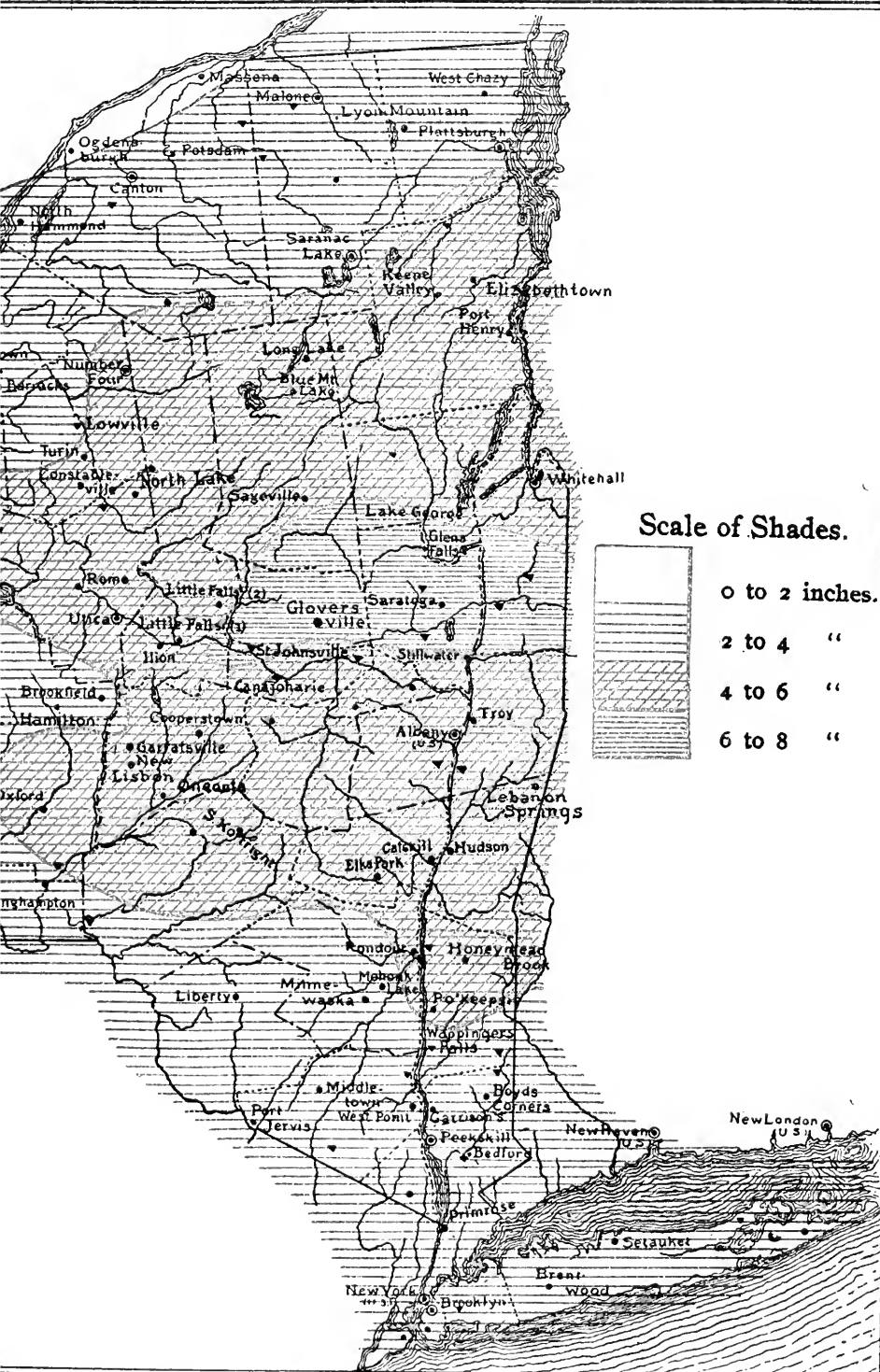
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR JUNE, 1897





Meteorological Summary for July, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) was 29.94 inches. The highest barometer was 30.36 inches at Albany on the 19th, and the lowest, 29.60 inches, at Ithaca and Oswego on the 11th. The lowest mean pressure obtained in western New York, and the highest in the eastern section. The mean pressure at 6 stations of the National Bureau was 0.03 inches below the normal, the deficiencies occurring mainly at western stations.

The mean temperature of the State was 72.1 degrees, as obtained from observations of maxima and minima at 79 stations. The highest local mean was 75.1 degrees at Canajoharie, and the lowest, 65.6 degrees, at South Kortright. The highest general daily mean was 81 degrees on the 5th, the lowest being 61 degrees on the 28th. The maximum temperature reported was 102 degrees at Avon on the 5th and 10th, and the minimum, 44 degrees at Elizabethtown on the 28th. The mean monthly range of temperature for the State was 41 degrees; the greatest local range being 55 degrees at South Kortright, and the least, 28 degrees, at Setauket. The mean daily range was 19 degrees. The greatest local daily range was 45 degrees at Straits Corners on the 2d, the least being 0 degrees at Cooperstown on the 28th. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 71.4 degrees; the Eastern Plateau, 71.0 degrees; the Northern Plateau, 69.2 degrees; the

Atlantic Coast, 72.8 degrees; the Hudson Valley, 73.6 degrees, the Mohawk Valley, 72.3 degrees; the Champlain Valley, 71.6 degrees; the St. Lawrence Valley, 73.2 degrees; the Great Lake Region, 73.3 degrees; the Central Lake Region, 73.2 degrees. The average temperature at 25 stations possessing records for previous years was 2.4 degrees above the normal, New York City alone reporting a deficiency. The largest excesses occurred in central New York and along the Lakes.

The mean relative humidity was 79 per cent. The mean dew point was 64 degrees.

The average precipitation for the State was 6.81 inches, as derived from the records of 104 stations. The least general rainfall, under 3 inches, occurred in portions of western-central New York and the lower St. Lawrence Valley; while in much of the eastern section the amount exceeded 10 inches. The maximum local rainfall was 18.18 inches at Setauket, L. I., and the minimum 2.20 inches at Mt. Morris. A list of heavy rates of rainfall will be found in the table of Meteorological Data. The rainfall for the State was 3.26 inches above the normal, as derived from the records of 26 stations possessing records of previous years. The greatest excesses obtained in the south and east. The rainfall exceeded any previously recorded at 9 stations, located principally in the south and east.

The average number of days on which the precipitation amounted to 0.01 inches or more was 14.4; the rain frequency being greatest in eastern New York and least in the western-central counties. The average number of clear days was 10.0; of partly cloudy days, 10.6; and of cloudy days, 10.4; giving an average cloudiness of 52 per cent. The least cloudiness obtained over the Western Plateau, and the greatest over the southeastern and northeastern sections.

The prevailing winds were from the southwest. The average wind travel for the month at 6 stations of the National Bureau was 6356 miles; the values being generally greater than usual for July. The maximum velocity recorded at the above stations was 54 miles per hour, northwest, at New York city on the 23d.

Electrical storms (including distant thunder or lightning) were reported as follows, by regions: In the western highlands on the 2d, 4th, 5th, 7th, 8th, 9th, 10th, 11th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 22d, 23d, 26th, 30th; the eastern highlands, 1st, 6th, 7th, 10th, 11th, 14th, 17th, 18th, 20th, 23d, 24th, 30th; northern highlands, 6th, 10th, 11th, 14th, 17th, 19th, 20th, 22d, 25th; Atlantic Coast, 2d, 6th, 12th, 14th, 18th, 19th, 20th, 22d, 24th, 25th, 28th, 29th, 31st; Hudson Valley, 2d, 6th, 7th, 10th, 11th, 12th, 14th, 17th, 18th, 21st, 23d, 25th, 30th; Mohawk Valley, 6th, 7th, 10th, 14th, 20th, 21st, 22d, 25th, 31st; Champlain Valley, 5th, 6th, 8th, 9th, 11th, 13th, 14th, 16th, 17th, 18th, 19th, 20th, 23d, 24th; St. Lawrence Valley, 6th, 11th, 18th, 19th, 20th, 21st, 23d, 31st; Great Lakes, 4th, 5th, 10th, 11th, 14th, 20th; Central Lakes, 5th, 11th, 14th, 17th, 18th, 19th, 20th, 23d, 30th.

Hail fell on the 5th, 6th, 10th, 11th, 13th, 14th, 20th, 22d, 23d, 29th.

Auroras were reported from northern stations on the 21st, 22d and 30th.

No frosts were reported.

GENERAL FEATURES OF THE WEATHER.

This month was remarkable for excessive heat and rainfall; both exceeding the values previously recorded for any month since the establishment of this Bureau in 1889. The excess of temperature occurred mainly during the period extending from

the 2d to the 12th, maxima of about 100 degrees being reported from stations in the Genesee Valley on and about the 5th. From the 12th to the 26th the temperature was slightly above normal, but a cooler wave followed on the dates from the 26th to 31st, with minima under 50 degrees in the cooler sections.

The precipitation was very unevenly distributed, portions of the western-central section and the St. Lawrence Valley reporting a drouth, while the rainfall was the heaviest on the records of many eastern stations. The total of 18.11 inches at Setauket, L. I., is without precedent in this State, so far as known. Phenomenally large amounts in single storms were also registered, as noted in the following table of data. The weather was generally fair during the hot period, or until the 12th, but thereafter showers were of almost daily occurrence.

Washing rains, and violent hail, wind and thunder storms were a noteworthy feature of this month's weather.

Five areas of high and six areas of low pressure were traced in the vicinity of the State on the July weather-maps; but the atmospheric movements were so sluggish and ill defined, during the first half of the month especially, that these numbers are only approximate. A decided westward drift of the atmosphere during the heated term is an unusual and noteworthy feature; the subsequent heavy rains being probably due to the large quantities of moisture thus carried inland from the ocean. The following is a brief account of the atmospheric movements:

Low I (the last of June), on the northeast coast, was followed by westerly winds and fair weather, reinforced by a slight rise of pressure from the Southern to Central States on the 1st and 2nd.

Low II, 29.6 inches, was a strong depression in the Northwest, but decreased and became general over Canada on the 4th; thereafter shifting over the provinces and vicinity of the Lakes until the 12th.

High I, 30.1 inches, originally over Nova Scotia on the 3d, shifted along the coast until the 10th, giving a drift of moist, southerly winds into Low II, but maintaining generally fair weather in this vicinity. These conditions brought intense heat and moderately high humidity throughout the Northern States, while scattering thunderstorms occurred along the southern border of the low, mainly on the 5th, 6th and 7th. This low concentrated over the St. Lawrence Valley on the 11th and 12th, when thunderstorms and general heavy rains occurred, with high winds near the lakes. Cooler weather followed, with westerly winds from

High II, 30.2 inches, originating in the West, and reaching the Central States on the 12th, thence moving southeast.

Low III, 29.7 inches, originated on the central coast on the 13th, giving flooding rains in southeastern New York. The area passed northward over Canada on the 14th and 15th, with continued rains and general thunderstorms. Generally fair and warm weather followed, as High II moved from the southern to the central coast.

High III, 30.3 inches, forming over Canada on the 16th, passed to the northeast coast, gave easterly winds and fair warm weather varied by showers, from the 17th to the 22d.

Low IV, 29.6 inches, originated in the Northwest, and moving slowly eastward, became general in the Northeast on the 23d to 25th, bringing cloudy weather and general rains and thunderstorms. The weather cleared somewhat on the 25th, but the approach of

Low V, 29.8 inches, which reached the lakes from the westward on the 26th, again brought general rains and high winds in the Lake Region. The presence of

High IV over the northeast coast on the 27th to 29th, with continued cloudiness, reduced the temperature to the lowest point reached during the month, Low V remaining in the vicinity of the

lakes, gave continued rains which were especially heavy in the Southeast on the 19th, when a secondary low appeared on the coast.

High V, 39.1 inches, was confined mainly to the Southern States, raising the temperature in New York to the normal value, by the 30th, in conjunction with

Low VI, 29.8 inches, which passed from the Upper Lakes to northern New York and Canada on the 31st, and was accompanied by scattering showers.

FARMING NOTES: After the cool weather of May and June, the hot wave of July was very beneficial to corn, late potatoes, vegetables and all belated crops. The greater part of the hay crop was secured in fine condition in the South, and the wheat and rye harvests were well under way. Oats were heading by the 10th, tobacco grew finely, and the prospect for tree and small fruits were exceedingly favorable. Drouth conditions were reported from portions of the western-central section and the lower Hudson Valley, but relief came with the general rains beginning on the 11th. The weather continuing warm during the two following weeks, with an abundant rainfall, was favorable for all farming interests excepting the hay and grain harvests, which were seriously delayed, and considerable losses resulted in the late northern counties. In the South oats were ready for cutting by the 31st, and were generally good, although much rust was locally reported. Hops were at first badly damaged by lice, but later the heavy rains improved the condition of the yards. Apples dropped from the trees to a considerable extent, while other fruits were abundant and sound.

Local storms, floods, etc., as reported by observers at the following stations: Angelica, high winds twisted off and uprooted trees on the evening of the 22d; Franklinville, on the 5th lightning injured three persons, killed a child and wrecked a dwelling in this vicinity. On the 11th a hail and thunderstorm and tornado nearby

damaged grain, uprooted trees and fired 2 barns. A destructive hailstorm occurred on the 20th. Reports were received of buildings and oil tanks fired and stock killed by lightning. Humphrey, heavy gale on 7th uprooted trees. Addison, a severe local storm on the 18th. South Canisteo, a cloudburst in the town of Almond on the 26th flooded Hornellsville. Wappingers Falls, heavy rains on the 13th and 14th caused the bursting of two reservoirs supplying Matteawan and Fishkill. A considerable tract of forest was wiped out, and the roadbed of the New York Central R. R. near Fishkill was carried away. Nine lives were lost. Baldwinsville, a thunderstorm with wind and hail damaged corn and tobacco on the 14th. Palermo, a barn burned by lightning on the 5th.

Cooperstown reports the greatest number of consecutive rainy days for any month during 44 years.

METEOROLOGICAL DATA

LOCATION OF STATIONS			BAROMETER.						HUMIDITY.		TEMPERA				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri daily observations.	Mean of maximum and minimum.	Highest.	Date.	
<i>Western Plateau.</i>															
Alfred.....	Allegany.....	1795										71.4	102	<i>b</i>	
Angelica.....	".....	1340										70.7	95	<i>5</i>	
Bolivar.....	".....	1800										69.3	95	<i>5</i>	
Friendship.....	".....	1550										69.6	97	<i>5</i>	
Franklinville.....	Cattaraugus.....	1598										70.4	96	<i>4</i>	
Humphrey.....	".....	1959									69.1	69.5	90	<i>c</i>	
†Arkwright.....	Chautauqua.....	1260										70.3	88	<i>4</i>	
Jamestown.....	".....	1324										71.8	95	<i>5</i>	
Elmira.....	Chemung.....	863										74.4	98	<i>5</i>	
Avon.....	Livingston.....	585										74.3	102	<i>b</i>	
Mt. Morris.....	".....	525													
Lockport.....	Niagara.....	650									72.9	74.6	99	<i>d</i>	
Wedgewood.....	Schuyler.....	1350									71.4	72.8	98	<i>10</i>	
Addison.....	Steuben.....	1000							73	60	70.8	71.5	95	<i>b</i>	
South Canisteo.....	".....	1480							81	63	67.8	69.2	95	<i>5</i>	
Arcade.....	Wyoming.....	1707									69.3	70.5	95	<i>4</i>	
<i>Eastern Plateau.</i>															
Binghamton (1).....	Broome.....	870									71.2	71.8	96	<i>b</i>	
Binghamton (2).....	".....	875										72.0	95	<i>9</i>	
Oxford.....	Chenango.....											71.0	98	<i>10</i>	
Cortland.....	Cortland.....	1120										70.8	94	<i>f</i>	
South Kortright.....	Delaware.....	1700										65.6	98	<i>6</i>	
Bouckville.....	Madison.....	1359													
Middletown.....	Orange.....	700									71.9	73.2	96	<i>10</i>	
Port Jervis.....	".....	470										72.1	93	<i>10</i>	
Cooperstown.....	Otsego.....	1250									69.8	70.5	91	<i>5</i>	
Garrattsville.....	Otsego.....										68.0	69.0	90	<i>b</i>	
New Lisbon.....	".....	1234										67.1	68.8	94	<i>10</i>
Oneonta.....	".....	1100										69.2	72.4	97	<i>10</i>
Perry City.....	Schuyler.....	1038									70.0	71.4	97	<i>10</i>	
Straits Corners.....	Tioga.....											72.0	97	<i>10</i>	
Waverly.....	".....	824									73.4	72.6	98	<i>10</i>	
Dryden.....	Tompkins.....	1079										71.8	96	<i>10</i>	
Mohonk Lake.....	Ulster.....	1245									70.7	70.6	89	<i>9</i>	
<i>Northern Plateau.</i>															
Elizabethtown.....	Essex.....											69.2	95	<i>b</i>	
Saranac Lake.....	Franklin.....											67.8	94	<i>5</i>	
Gloversville.....	Fulton.....	850										70.0	95	<i>5</i>	
											70.2	70.7	93	<i>6</i>	
Little Falls (2a).....	Herkimer.....	1526										69.4	93	<i>5</i>	
North Lake.....	".....											67.6	91	<i>6</i>	
Lowville.....	Lewis.....	900										70.6	95	<i>b</i>	
Number Four.....	".....	1571	29.96	30.24	<i>a</i>	29.65	11	0.59	85	62		68.0	90	<i>g</i>	
<i>Atlantic Coast.</i>															
Brooklyn.....	Kings.....	70										72.8	96	<i>e</i>	
Manhattan Beach.....	".....											74.4	93	<i>10</i>	
												70.9	90	<i>1</i>	
New York City.....	New York.....	314	29.98	30.33	19	29.67	12	0.66	82			73.0	89	<i>10</i>	
Willet's Point.....	Queens.....											73.6	92	<i>10</i>	
Brentwood.....	Suffolk.....	80									71.2	72.0	92	<i>h</i>	
Setauket.....	Suffolk.....	40							83	67	71.8	72.4	88	<i>10</i>	
Bedford.....	Westchester.....	290										71.6	92	<i>10</i>	
Frimrose.....	".....	200										74.1	96	<i>e</i>	

FOR JULY, 1897—(Continued).

TURE—(IN DEGREES FAHR.).								SKY.				PRECIPITATION—(INCHES).					Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.	
47	n	44	21	44	10	4	28	11.2	11.6	8.2	14.2	5.02	2.97	h. m. 3.55	11	.....	.....
50	15	45	21	35	7	9	29	.....	.....	.....	12	5.14	1.99	.....	26-27	.....	.....
48	n	47	23	32	<i>ag</i>	9	<i>cc</i>	4	17	10	17	6.36	1.30	.....	23	.....	S. W.
47	n	50	28	40	14	14	<i>cd</i>	.....	.....	.....	18	4.47	0.86	.....	12	.....	.....
51	n	45	21	35	7	7	<i>w</i>	10	8	13	18	5.88	2.00	19.00	11-12	.....	S.
52	15	38	18	32	3	7	<i>ce</i>	6	14	11	19	7.77	2.00	0.45	5	.....	S. W.
56	13	32	12	19	<i>ah</i>	4	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
53	15	42	19	31	3	6	<i>cf</i>	5	21	5	12	5.98	1.59	2.30	20	.....	N. W.
55	p	43	21	31	11	7	27	19	0	12	11	3.23	0.97	.....	27	.....	S. E.
55	16	47	24	44	10	9	12	6	14	11	14	4.08	0.90	.....	11	.....	.....
57	13	42	23	34	3	10	17	13	1	9	7	2.20	0.50	.....	27	.....	W.
57	13	42	23	34	3	10	28	21	6	4	7	3.30	1.00	.....	26	.....	W.
53	29	45	22	32	<i>aj</i>	6	27	4	23	4	13	3.43	0.78	23.35	11-12	.....	S. W.
51	15	44	21	31	10	7	12	18	6	7	17	4.52	0.88	.....	18	.....	S. W.
48	15	47	24	35	7	8	12	13	7	11	14	5.62	1.70	1.00	20	.....	W.
53	q	42	20	31	3	8	29	12	10	9	18	8.35	2.97	3.55	11	.....	W.
46	30	44	20	45	2	0	28	10.9	11.7	8.4	13.1	5.98	2.23	.....	14	.....	.....
54	18	42	20	31	<i>ak</i>	5	27	9	14	8	12	2.54	0.70	.....	28	.....	S. E.
53	15	42	18	31	9	6	<i>cg</i>	3	19	9	12	2.30	0.73	.....	27	.....	S. E.
48	15	50	25	39	3	11	28	5	20	6	15	8.04	1.95	.....	24	.....	S.
50	3	44	20	36	3	8	28	19	7	5	11	4.46	0.77	.....	27	.....	S. E.
.....	.....	.....	27	42	<i>am</i>	10	29	.....	.....	.....	11	5.56	1.28	.....	12-13	.....	.....
53	29	43	19	27	5	6	13	10	10	11	.....	9.14	2.57	.....	12-13	.....	.....
55	28	38	17	20	4	3	13	16	9	6	14	9.23	2.38	.....	26	.....	S. W.
53	3	38	13	30	3	0	28	8	11	12	19	4.86	1.23	.....	28	.....	S.
52	r	38	19	29	3	5	26	14	8	9	12	6.21	1.67	6.00	21	.....	W.
48	3	46	21	38	3	7	13	9	8	14	16	5.58	1.46	.....	28	.....	S.
51	3	46	24	38	3	10	13	.....	.....	.....	11	6.61	2.11	.....	28	.....	.....
51	29	46	23	37	4	7	27	8	15	8	13	3.55	0.97	5.50	23	.....	S. W.
49	15	48	23	45	2	2	29	17	5	9	10	4.04	1.39	.....	27	.....	N.
46	30	52	23	39	30	6	11	13	11	7	12	4.50	1.50	.....	27	.....	S.
52	17	44	21	34	3	8	27	11	15	5	14	4.30	1.00	.....	12	.....	S.
53	28	36	13	22	9	4	13	.....	.....	.....	15	14.71	3.23	.....	14	.....	S.
44	28	43	20	38	<i>k</i>	4	<i>ch</i>	9.3	10.9	10.8	15.7	7.18	5.25	2.00	6	.....	.....
44	28	50	22	38	<i>k</i>	8	12	11	13	7	15	13.00	5.25	2.00	6	.....	W.
51	s	44	21	31	7	6	29	6	19	6	17	8.55	2.00	.....	13	.....	S. W.
52	t	41	20	33	3	4	28	10	7	14	17	9.80	2.32	6.00	25	.....	N. E.
51	s	42	19	30	3	5	29	11	4	16	16	5.31	0.82	.....	22	.....	W.
50	u	41	17	31	5	4	29	9	9	13	14	4.15	1.50	.....	17	.....	S. E.
50	2	45	21	37	3	8	<i>dd</i>	9	16	6	17	2.96	0.51	.....	11-12	.....	W.
49	2	41	17	32	7	4	29	9	8	14	14	6.46	2.45	10.05	29	.....	W.
55	16	33	16	36	1	2	5	10.3	8.9	11.8	15.1	11.20	6.07	.....	13	.....	.....
61	v	32	16	29	10	3	13	11	4	16	16	11.06	2.75	12.00	13	.....	S. E.
60	27	30	9	24	1	2	5	14	7	10	16	8.51	2.32	.....	14	.....	S. W.
60	27	29	13	21	14	4	26	8	10	13	19	9.52	1.78	.....	13	.....	S.
60	w	32	17	25	<i>bb</i>	7	27	.....	.....	.....	16	9.75	2.20	.....	13	.....	S. W.
55	16	37	20	36	1	6	13	18	0	13	11	10.00	2.80	16.00	29	.....	S. W.
60	1	28	14	22	1	4	28	8	11	12	11	18.18	6.07	.....	13	.....	S.
57	27	35	17	28	<i>dc</i>	6	<i>w</i>	8	12	11	19	11.42	2.82	23.00	13	.....	S. E.
58	x	38	20	31	5	7	28	5	18	8	13	11.12	3.11	.....	13	.....	.....

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative	Dew point (degrees)	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
<i>Hudson Valley.</i>														
Albany.....	Albany.....	97	29.97	30.36	19	29.65	11	0.71	78	65	73.6	75.0	99	10
Honey-mead Brook.....	Dutchess.....	450	.....	.....	.....	.....	.....	.....	.....	.....	70.8	71.6	92	6
Poughkeepsie.....	".....	180	.....	.....	.....	.....	.....	.....	.....	.....	73.0	73.0	96	e
Wappingers Falls.....	Dutchess.....	110	.....	.....	.....	.....	.....	.....	.....	.....	71.8	71.8	99	10
Catskill.....	Greene.....	450	.....	.....	.....	.....	.....	.....	.....	.....	73.3	73.3	95	10
West Point.....	Orange.....	167	.....	.....	.....	.....	.....	.....	.....	.....	74.4	74.4	96	11
Carmel.....	Putnam.....	500	.....	.....	.....	.....	.....	.....	.....	.....	73.3	73.3	93	10
<i>Mohawk Valley.</i>														
Little Falls (1a).....	Herkimer.....	924	.....	.....	.....	.....	.....	.....	.....	.....	72.3	72.3	99	5
Canajoharie.....	Montgomery.....	300	.....	.....	.....	.....	.....	.....	.....	.....	74.6	75.1	99	5
St. Johnsville.....	".....	810	.....	.....	.....	.....	.....	.....	.....	.....	70.8	70.8	91	5
Rome.....	Oneida.....	445	.....	.....	.....	.....	.....	.....	.....	.....	72.0	72.0	97	11
<i>Champlain Valley.</i>														
Plattsburgh Barks.....	Clinton.....	125	.....	.....	.....	.....	.....	.....	.....	.....	71.6	71.6	94	j
Ticonderoga.....	Essex.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.2	71.2	93	10
Glen Falls.....	Warren.....	340	.....	.....	.....	.....	.....	.....	.....	.....	71.6	73.1	94	j
Lake George.....	".....	350	.....	.....	.....	.....	.....	.....	83	66	70.4	70.9	92	6
<i>St. Lawrence Valley.</i>														
Madison Barracks.....	Jefferson.....	266	.....	.....	.....	.....	.....	.....	.....	.....	73.2	73.2	100	5
Watertown.....	".....	4-6	.....	.....	.....	.....	.....	.....	.....	.....	74.2	74.2	99	11
Canton.....	St. Lawrence.....	304	.....	.....	.....	.....	.....	.....	.....	.....	71.1	72.8	98	5
North Hammond.....	St. Lawrence.....	300	.....	.....	.....	.....	.....	.....	.....	.....	72.3	73.4	100	5
Ogdensburg.....	".....	258	.....	.....	.....	.....	.....	.....	.....	.....	72.2	72.2	95	7
Potsdam.....	".....	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Great Lakes.</i>														
Westfield.....	Chautauqua.....	758	.....	.....	.....	.....	.....	.....	.....	.....	73.3	73.3	99	k
Buffalo.....	Erie.....	768	29.92	30.33	19	29.66	11	0.57	71	63	71.9	74.0	95	10
Pittsford.....	Monroe.....	502	.....	.....	.....	.....	.....	.....	.....	.....	71.9	72.7	98	5
Rochester.....	".....	523	29.92	30.26	19	29.62	11	0.64	74	63	71.9	74.0	99	k
Appleton.....	Niagara.....	301	.....	.....	.....	.....	.....	.....	.....	.....	72.5	72.5	98	k
Fort Niagara.....	".....	263	.....	.....	.....	.....	.....	.....	.....	.....	74.0	74.0	95	k
Baldwinsville.....	Onondaga.....	390	.....	.....	.....	.....	.....	.....	.....	.....	72.3	74.4	98	5
Ridgeway.....	Orleans.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73.2	73.2	96	4
Oswego.....	Oswego.....	335	29.92	30.30	19	29.60	11	0.70	79	64	72.0	72.0	94	5
Palermo.....	".....	460	.....	.....	.....	.....	.....	.....	.....	.....	71.1	71.6	95	9
Lyons.....	Wayne.....	407	.....	.....	.....	.....	.....	.....	.....	.....	73.4	74.1	96	5
Erie, Pa.....	Erie.....	714	29.93	30.19	19	29.60	12	0.50	73	64	73.0	73.0	94	10
<i>Central Lakes.</i>														
Fleming.....	Cayuga.....	1000	.....	.....	.....	.....	.....	.....	.....	.....	73.0	73.4	95	5
Watkins.....	Schuyler.....	.....	.....	.....	.....	.....	.....	.....	81	67	73.2	73.2	96	5
Romulus.....	Seneca.....	719	.....	.....	.....	.....	.....	.....	83	63	74.0	74.0	97	b
Ithaca.....	Tompkins.....	810	29.93	30.29	19	29.60	11	0.69	74	63	70.9	72.4	94	10
Mean.....		...	29.94	30.36	19	29.60	11	0.63	79	64	72.1	72.1	102	b

* Mean of the tri-daily observations. † Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula $(7 \text{ a. m.} + 2 \text{ p. m.} + 9 \text{ p. m.}) \div 4$, (1) Voluntary observer. (2) United States Weather Bureau. (1a) City Reservoir; (2a) Intake (a) 18, 13; (b) 5, 10; (c) 5, 8, 18; (d) 3, 10; (e) 6, 10; (f) 10, 11; (g) 5, 7, 10; (h) 1, 10; (i) 5, 6, 9; (v) 5, 16, 27, 28, 29, 30; (w) 27, 28; (x) 1, 16, 27; (y) 17, 21, 27, 31; (z) 2, 3; (aa) 27, 30; (ab) 1, 28; 10 16; (am) 1, 5; (bb) 10, 14; (bc) 9, 10; (bd) 5, 19; (be) 11, 26; (bf) 2, 3, 10; (bg) 3, 17; (bh) 3, 4; (de) 27, 29; (df) 12, 28.

FOR JULY, 1897 — (Concluded).

TEMPERATURE—(IN DEGREES FAHR.).							SKY.		PRECIPITATION — (INCHES).							Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.		Total snowfall.
55	1	39	18	31	1	3	13	9.3	9.5	12.2	16.6	11.71	5.03	<i>h. m.</i> 1.30	2	.....	.....
56	28	40	17	26	16	6	13	7	15	9	16	6.67	3.11	.....	14	.....	S.
56	<i>w</i>	36	18	28	<i>bd</i>	6	13	7	10	14	18	14.55	3.20	1.45	6	.....	S. W.
55	1	41	21	31	1	8	23	10	5	16	21	9.37	3.25	.....	12	.....	S.
58	28	41	19	30	10	7	28	8	14	9	19	11.84	2.00	3.00	14	.....	S. W.
58	<i>w</i>	37	16	25	16	3	13	6	11	14	11	9.82	2.75	18.30	29	.....	S.
58	27	38	18	28	1	5	<i>ch</i>	.....	.....	.....	17	13.05	3.70	.....	14	.....	S.
56	<i>y</i>	37	20	30	17	7	28	18	2	11	14	16.64	5.03	1.30	2	.....	.....
52	26	42	18	39	3	5	28	13.7	4.7	12.6	15.5	5.19	1.85	.....	20	.....	.....
53	7	41	16	26	10	5	28	17	2	12	14	4.68	0.77	.....	12	.....	E.
53	<i>z</i>	46	17	33	3	6	<i>de</i>	15	2	14	15	6.48	1.29	.....	12	.....	E.
53	28	38	16	29	3	6	29	9	10	12	19	4.67	0.79	.....	12	.....	W.
52	26	45	21	31	<i>be</i>	10	<i>df</i>	.....	.....	.....	14	4.92	1.85	.....	20	.....	.....
52	<i>aa</i>	41	18	30	<i>bf</i>	6	29	5.5	11.0	14.5	15.3	8.28	2.88	15.45	14	.....	.....
52	36	41	18	30	10	6	29	.....	.....	.....	10	7.19	2.30	.....	24	.....	S. W.
52	27	42	20	30	<i>z</i>	10	<i>df</i>	6	10	15	16	8.82	2.63	.....	14	.....	S.
53	27	39	16	27	1	8	13	5	12	14	20	8.83	2.88	15.45	14	.....	S. E.
53	28	43	20	38	4	4	13	10.7	12.7	7.6	12.2	4.77	1.50	14.00	11-12	.....	.....
53	28	46	22	36	12	10	3	.....	.....	.....	11	2.55	0.40	.....	23	.....	S. W.
54	28	44	22	37	7	6	13	8	12	11	14	7.58	1.36	.....	28	.....	S. W.
56	<i>ab</i>	44	21	38	4	4	13	11	11	9	13	4.33	1.20	.....	28	.....	S. W.
57	28	38	17	30	7	6	12	13	15	3	11	4.62	1.50	14.00	11-12	.....	S. W.
49	2	39	18	31	2	3	29	10.6	11.0	9.4	14.8	5.92	3.26	.....	11	.....	.....
57	<i>ac</i>	37	18	26	18	7	28	15	1	15	15	8.21	3.05	2.30	11	.....	S. E.
58	13	37	14	24	7	6	28	4	16	11	14	8.29	2.02	.....	11	.....	S. W.
57	<i>ad</i>	41	29	30	3	8	29	7	10	14	16	6.37	2.15	6.35	11	.....	N. W.
59	15	40	18	26	4	7	12	12	10	9	15	6.37	3.26	.....	11	.....	S. W.
56	<i>ae</i>	42	20	29	4	8	28	12	10	9	15	5.08	2.60	.....	11-12	.....	E.
58	1	37	18	25	7	10	12	.....	.....	.....	12	7.01	2.50	.....	26	.....	S. W.
55	<i>w</i>	43	20	30	3	11	28	13	9	9	13	5.95	1.84	.....	13	.....	.....
58	13	38	18	30	8	6	28	8	23	0	15	5.51	1.21	.....	27	.....	S. W.
55	27	39	14	22	2	4	25	11	9	11	13	3.15	0.60	.....	22	.....	S. E.
49	2	46	19	34	2	4	12	12	13	6	17	4.22	1.19	24.00	12	.....	S. W.
58	<i>af</i>	38	17	28	10	8	29	12	12	7	17	5.04	1.68	.....	11	.....	S. E.
59	14	35	14	22	22	3	29	11	8	12	15	5.81	1.55	.....	18	.....	S.
53	17	40	18	31	<i>bg</i>	4	13	8.5	14.2	8.3	11.2	3.61	1.01	15.10	12	.....	.....
57	<i>w</i>	38	16	24	3	4	12	5	21	5	8	3.86	0.90	10.00	26	.....	S.
53	17	43	21	31	<i>bg</i>	8	12	8	12	11	14	3.19	0.71	.....	12	.....	S. E.
57	<i>w</i>	40	20	28	<i>bh</i>	8	12	11	12	8	11	4.14	0.88	.....	12	.....	S.
56	1	38	17	30	3	7	<i>w</i>	10	12	9	12	3.25	1.01	15.10	12	.....	S. E.
44	28	41	19	45	2	0	28	10.0	10.6	10.4	14.4	6.89	6.07	.....	13	.....	S. W.

Thermograph. || Report received too late to be used in computing means. The means from the f Blank indicates that the duration is not shown in the original records, but is within 24 hours. conduit, nine miles north of city.

(k) 4, 5; (m) 1, 10; (n) 15, 16; (p) 15, 29; (q) 13, 14, 15; (r) 15, 27; (s) 1, 2; (t) 3, 27, 28; (u) 2, 28; (ac) 14, 30; (ad) 2, 15; (ae) 1, 15, 16; (af) 1, 2, 27, 28; (ag) 3, 7, 16; (ah) 7, 21; (aj) 1, 3; (ak) 3, 9, 10; (ce) 12, 29; (cd) 12, 27, 29; (ce) 12, 27, 28; (cf) 24, 28; (cy) 26, 27; (ch) 23, 29; (dd) 12, 28, 29

TEMPERATURE—JULY, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	70	69	75	80	83	77	75	77	78	79	77	66	68	67
<i>Angelica.....</i>	82	77	87	93	95	86	91	91	90	92	81	66	68	81
	55	57	63	71	74	66	56	65	64	61	67	59	59	55
<i>Bolivar</i>	82	80	88	91	95	84	87	89	90	91	85	69	76	75
	58	51	56	60	66	66	55	59	61	60	61	60	55	55
<i>Friendship.....</i>	87	89	92	96	97	89	92	94	95	95	89	69	80	76
	53	49	52	58	65	63	53	56	60	58	59	55	53	53
<i>Franklinville</i>	81	81	90	96	94	85	89	91	91	93	88	73	78	72
	58	52	58	63	69	68	54	59	67	63	67	62	55	55
<i>Humphrey</i>	81	81	89	90	90	85	87	90	88	90	85	69	79	72
	56	57	57	62	65	67	60	65	67	68	65	62	55	55
<i>Arkwright</i>														
<i>Jamestown.....</i>	82	84	91	94	95	85	89	90	88	94	88	75	84	74
	58	59	60	69	72	70	69	66	67	68	68	68	54	56
<i>Elmira</i>	87	80	92	96	98	96	94	90	95	95	95	73	85	84
	63	62	63	74	74	67	72	67	65	65	64	63	70	59
<i>Avon</i>	83	86	93	99	102	86	90	97	96	102	94	72	79	79
	59	56	60	73	75	75	59	60	59	58	68	63	58	59
<i>Lockport.....</i>	81	87	99	98	98	85	90	92	95	99	89	77	78	82
	58	59	65	71	75	70	62	63	68	71	69	62	57	58
<i>Wedgewood.....</i>	89	89	16	91	95	88	93	93	95	98	93	69	80	83
	57	59	64	68	70	68	65	67	67	69	67	60	59	58
<i>Addison</i>	83	79	89	89	95	87	90	90	93	95	90	70	79	79
	59	58	59	62	68	67	60	62	63	64	63	63	60	59
<i>South Canisteo.....</i>	82	82	80	91	95	85	88	90	92	93	89	69	79	78
	52	50	53	61	65	63	53	58	62	59	61	61	54	55
<i>Arcade.....</i>	79	80	89	95	94	81	86	92	92	92	88	70	75	72
	56	55	58	70	71	67	57	63	66	67	64	57	53	53
<i>Eastern Plateau ...</i>	70	69	70	75	79	79	78	78	80	80	77	70	69	70
<i>Binghamton (1)</i>	83	80	88	89	96	90	90	90	94	96	90	75	75	80
	59	58	57	66	67	70	65	67	63	65	65	64	63	60
<i>Binghamton (2)</i>	83	80	87	90	93	88	91	91	95	94	88	74	74	79
	59	60	56	68	69	71	67	69	64	65	70	64	63	59
<i>Oxford</i>	83	85	89	93	95	92	93	97	95	98	92	77	72	83
	54	53	50	61	62	67	63	63	61	61	67	63	60	58
<i>Cortland</i>	82	80	86	85	87	90	89	88	91	94	94	88	75	76
	54	55	50	62	66	67	65	67	64	63	69	63	59	58
<i>South Kortright....</i>	87	83	87	90	96	98	93	92	96	96	90	81	73	83
	45	52	47	52	54	64	62	60	58	58	64	63	61	59
<i>Middletown.....</i>	85	85	85	87	92	95	90	86	89	96	87	82	74	85
	60	65	60	61	65	69	68	65	65	70	70	69	68	68
<i>Port Jervis</i>	87	85	86	86	91	92	88	85	90	93	89	80	71	80
	59	64	59	57	64	67	66	65	63	70	70	67	68	66
<i>Cooperstown</i>	77	77	83	87	91	87	85	88	88	88	85	72	68	77
	61	58	53	65	68	70	70	72	69	70	70	65	64	62
<i>Garrattsville.....</i>	78	75	82	85	90	86	88	86	88	90	85	71	89	76
	56	53	53	65	64	68	64	65	64	65	67	63	62	59
<i>New Lisbon.....</i>	80	79	86	87	92	89	88	88	90	94	86	74	68	78
	55	52	48	56	60	65	63	62	60	61	65	62	61	59
<i>Oneonta.....</i>	87	84	89	94	96	93	92	94	96	97	91	80	72	86
	56	55	51	61	65	67	64	65	63	63	68	64	62	61
<i>Perry City.....</i>	82	81	88	92	96	86	88	93	94	97	84	72	79	78
	52	53	54	65	70	68	60	63	65	65	63	60	59	56
<i>Strait's Corners ...</i>	89	90	83	87	90	85	95	93	95	97	88	70	79	82
	53	55	55	54	63	63	63	63	60	62	65	62	61	56
<i>Waverly</i>	89	84	90	90	97	94	97	92	94	98	74	74	80	82
	55	55	58	63	65	67	64	67	61	65	68	64	62	59
<i>Dryden</i>	82	81	89	91	95	85	90	93	93	96	91	71	80	78
	53	55	55	67	71	67	64	69	67	65	70	62	61	58
<i>Mohonk Lake.....</i>	79	78	80	81	86	88	88	80	89	88	80	77	71	79
	62	64	63	64	67	63	68	63	67	69	67	66	67	65

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS. LYNEB

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
66	69	70	73	71	72	72	74	69	68	72	71	64	64	62	69	67	71.4
79	81	78	82	79	82	81	84	73	72	79	80	71	70	65	81	76	70.7
50	51	58	59	62	61	58	62	60	60	65	60	58	57	56	55	54	
76	80	78	83	79	81	82	84	75	72	80	82	69	71	65	81	78	69.3
48	48	58	61	60	60	58	60	60	60	65	59	58	59	56	53	53	
79	84	81	79	83	83	85	87	76	78	84	84	70	73	67	84	77	69.6
47	47	55	56	59	56	53	59	58	56	61	56	56	53	53	52	52	
72	81	80	83	80	81	82	84	73	71	79	80	68	67	68	81	75	70.4
51	51	60	62	62	62	58	59	62	62	64	60	61	60	57	55	55	
75	79	75	79	76	76	73	82	72	69	77	81	66	65	64	80	75	69.5
52	55	62	63	63	63	62	60	60	61	63	60	59	58	55	56	57	
78	83	70	80	79	82	84	84	73	68	79	84	71	66	67	81	72	71.8
53	57	63	64	63	64	61	64	63	62	65	62	62	60	58	55	58	
85	86	84	86	83	81	88	90	79	78	84	80	63	71	72	80	83	74.4
55	56	65	68	65	65	65	63	64	65	68	63	56	57	55	60	60	
82	86	87	90	86	91	90	90	85	79	83	81	78	75	73	84	80	
56	55	63	62	63	64	60	69	63	63	63	64	62	62	60	59	59	74.3
81	88	86	90	87	85	94	88	78	80	83	80	84	72	71	87	78	74.6
58	58	64	64	62	63	63	65	64	64	63	67	62	62	60	58	59	
85	87	87	83	82	83	83	91	73	76	81	80	61	65	68	84	80	
54	59	62	64	63	62	62	65	62	60	65	60	55	55	53	59	60	72.8
81	84	78	81	80	82	82	87	74	76	81	81	68	72	66	84	80	
51	54	59	64	64	63	66	65	63	61	65	66	58	58	54	57	58	71.5
81	84	77	83	76	81	80	84	74	74	80	80	67	72	67	81	79	69.2
48	50	54	64	60	62	57	59	62	58	64	58	56	57	53	53	55	
76	84	79	82	80	79	83	82	75	71	78	82	72	71	64	80	74	70.5
53	54	61	64	63	64	62	62	61	60	64	61	60	59	56	58	58	
69	69	71	70	72	73	73	75	70	69	71	67	59	59	63	68	70	71.0
80	87	82	82	82	80	83	85	82	79	80	70	60	63	72	77	79	71.8
56	56	57	54	62	60	65	69	62	61	63	63	55	55	58	60	60	
80	84	81	79	80	80	82	87	78	77	79	70	61	63	70	80	80	72.0
53	56	62	65	64	66	67	70	62	62	66	64	55	55	59	60	63	
83	86	81	81	82	85	85	85	78	79	80	74	68	65	77	80	83	71.0
48	52	59	57	59	59	59	64	58	56	62	60	53	54	55	58	55	
81	84	81	80	77	80	82	82	78	78	78	73	63	63	68	86	78	70.8
53	53	63	63	62	64	64	63	62	68	60	62	54	55	55	60	60	
81	85	82	79	81	86	85	83	82	76	82	.....	65	66	63	78	78	65.6
50	48	59	55	58	56	62	60	59	56	60	.....	51	51	53	51	57	
90	80	85	75	85	82	80	85	82	86	75	72	62	72	72	79	80	73.2
68	60	60	65	66	65	66	66	65	65	63	61	55	55	53	60	63	
89	84	80	74	79	78	78	82	83	75	78	76	68	60	69	78	80	72.1
65	56	65	64	65	66	67	69	64	62	64	62	56	55	59	60	62	
76	82	73	77	75	82	79	78	76	70	75	68	63	59	63	71	77	70.5
56	60	65	63	61	66	65	65	60	62	67	63	58	59	58	60	61	
77	82	81	75	76	81	80	79	75	70	74	67	66	60	71	75	75	69.0
52	55	54	60	61	64	63	67	55	54	64	62	52	54	56	58	59	
79	83	73	77	78	81	82	83	77	73	76	69	64	61	73	76	78	68.8
51	50	57	57	57	58	62	64	58	56	63	60	52	53	56	58	59	
85	89	78	80	85	88	89	88	80	75	79	78	65	64	79	81	81	72.4
54	53	60	58	59	62	69	67	61	59	63	61	53	53	55	58	60	
84	84	84	84	85	86	86	88	79	78	80	78	63	67	70	82	79	71.4
63	53	61	61	61	61	59	66	60	61	65	63	56	52	51	59	55	
85	84	89	88	82	83	83	86	86	76	79	74	63	63	63	80	82	72.0
49	52	64	65	67	66	62	67	62	65	63	63	58	57	61	63	61	
86	86	83	82	85	85	84	88	79	78	85	75	66	66	70	85	83	72.6
52	54	60	65	67	62	64	68	65	62	67	66	57	57	55	46	57	
82	86	86	85	85	85	84	85	75	76	78	74	62	65	71	80	78	71.8
53	54	52	64	64	64	64	67	60	62	66	61	54	55	54	60	62	
79	79	77	69	76	77	75	77	79	74	78	69	63	60	65	74	77	70.6
62	62	69	64	65	66	66	67	65	63	65	59	54	53	57	61	65	

TEMPERATURE — JULY, 1897, SHOWING DAILY MEANS FOR
STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau...</i>	65	65	69	74	79	77	76	77	78	79	75	67	66	66
Elizabethtown.....	78	74	84	84	94	86	90	88	92	88	70	70	68	70
Saranac Lake.....	48	58	50	48	56	60	64	72	64	68	64	62	58	50
	80	80	87	93	95	90	91	93	92	93	89	70	72	79
Gloversville	51	51	58	68	70	60	60	65	63	72	65	59	62	53
	80	80	85	87	92	93	90	88	91	92	87	76	77	79
Little Falls (2a)...	58	54	52	55	65	70	65	69	68	65	67	63	64	63
	79	79	86	89	93	88	92	89	90	92	88	71	71	77
North Lake.....	51	51	56	63	71	60	66	65	65	69	66	63	60	54
	65	75	76	84	86	91	88	73	88	88	90	84	69	68
Lowville.....	58	50	52	59	55	68	65	65	63	63	69	65	62	60
	82	80	88	93	95	88	92	93	94	95	90	70	70	78
Number Four.....	52	50	51	59	71	69	58	64	70	64	67	62	61	59
	72	73	83	88	90	85	90	89	89	90	83	67	68	72
	52	49	52	62	70	70	58	66	67	61	61	62	60	58
<i>Atlantic Coast.....</i>	74	73	73	72	74	78	75	73	76	78	75	76	72	72
Brooklyn	69	89	84	85	88	91	85	92	90	93	84	83	73	84
	68	68	64	67	61	72	69	70	68	64	69	69	70	68
Manhattan Beach	90	70	72	76	68	74	75	76	74	78	76	76	74	72
	66	64	66	66	66	68	68	68	68	70	70	70	64	68
New York City	80	83	82	76	82	88	80	80	84	89	80	80	76	84
	66	67	65	66	67	69	70	66	68	70	67	70	68	63
|| Willet's Point ...	84	82	81	81	84	90	83	83	89	92	83	84	76	86
	66	62	65	64	68	70	63	65	67	67	68	69	67	61
<i>Brentwood</i>	92	81	90	82	83	88	88	84	88	92	86	82	74	80
	56	64	60	57	67	68	59	55	62	62	66	71	68	64
Setauket	82	80	79	79	85	87	83	81	87	88	83	85	76	80
	60	66	63	65	65	68	68	61	67	67	66	72	69	65
Bedford.....	83	71	83	81	87	90	83	83	80	82	82	84	75	83
	59	62	63	65	62	67	65	61	62	64	67	66	68	64
Primrose	88	87	88	87	91	96	88	87	93	96	82	88	79	88
	58	61	65	64	60	66	67	62	63	66	65	68	69	67
<i>Hudson Valley</i>	72	74	75	76	78	82	79	76	80	82	78	76	73	74
Albany	86	84	88	87	92	95	92	83	93	96	87	82	74	86
	62	63	65	68	69	74	71	70	71	73	70	69	68	65
Honeymead Brook.	81	84	83	82	89	92	88	83	87	91	83	80	74	82
	57	58	60	64	61	66	65	62	66	67	68	69	63	65
Poughkeepsie	86	86	88	86	93	96	92	88	94	96	86	84	77	86
	55	61	58	62	65	68	65	63	67	66	68	69	68	63
<i>Wappinger's Falls</i>	88	89	87	88	94	97	91	88	94	99	87	88	78	84
	60	61	64	65	66	71	64	64	74	69	70	70	69	67
Catskill.....	83	83	85	85	91	93	90	85	91	95	86	80	73	83
	63	61	62	67	68	73	69	68	67	71	68	68	70	66
West Point.....	89	90	89	88	83	89	93	87	88	94	96	87	87	77
	61	68	64	68	65	67	68	65	65	67	70	70	69	67
Carmel	85	84	85	88	89	92	88	86	92	93	85	83	80	88
	62	64	65	68	69	71	64	67	70	72	68	62	60	63
<i>Mohawk Valley ...</i>	71	68	73	79	82	80	81	81	81	81	80	71	68	69
Little Falls (1a)....	80	80	87	89	92	87	92	89	90	94	88	72	70	78
	67	56	65	69	69	67	68	70	70	68	68	62	62	58
Canajoharie.....	84	86	92	97	99	90	94	92	94	96	92	83	74	80
	63	53	53	65	71	75	73	74	74	73	75	70	66	66
St. Johnsville.....	79	77	83	88	91	88	87	87	89	90	86	83	71	77
	59	55	54	61	69	72	67	69	68	67	69	67	64	63
Rome	80	83	88	94	95	92	97	95	95	96	97	72	75	78
	53	55	63	68	70	65	68	68	68	67	66	62	59	55
<i>Champlain Valley.</i>	69	69	69	75	79	81	78	78	80	78	75	72	68	70
Plattsburgh Bar'a'ks	72	80	79	83	80	87	89	90	89	93	83	83	68	68
	58	60	58	68	70	73	66	68	70	63	59	64	59	60
<i>Ticonderoga</i>	85	85	86	88	94	94	91	89	94	90	86	75	77	84
Glens Falls.....	62	55	56	64	74	70	68	69	68	69	70	65	65	65
	81	80	83	82	87	92	88	83	90	88	83	75	74	80
Lake George	54	55	54	66	67	71	66	69	68	68	71	66	66	66

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mead.
66	69	70	70	76	71	73	71	69	66	68	65	59	56	58	64	65	69.2
80	80	84	82	82	82	86	80	80	80	70	72	68	64	64	70	68	
54	64	66	60	62	62	64	58	56	54	56	50	46	44	46	48	50	67.8
79	84	84	82	80	83	82	79	80	69	77	71	73	65	62	75	71	
54	55	55	60	63	58	65	59	61	59	58	58	54	54	56	58	58	70.0
79	83	83	76	81	84	82	81	81	74	84	67	64	59	64	78	79	70.7
56	53	60	61	65	61	63	65	60	59	63	60	52	52	56	58	60	
72	82	82	78	89	80	80	77	75	73	79	69	63	59	64	74	75	60.4
52	57	60	64	63	60	67	59	57	63	62	54	52	53	59	69	59	
73	76	79	80	76	76	80	79	76	74	73	76	67	62	67	62	71	67.6
53	53	57	59	61	61	62	62	61	59	61	62	54	50	53	56	52	
79	85	82	82	84	84	84	82	77	73	78	76	66	60	65	77	73	70.6
59	58	58	57	62	63	61	67	64	57	61	60	52	52	57	56	61	
75	79	79	79	78	78	79	78	72	72	74	74	63	58	60	72	69	68.0
55	53	57	58	62	62	62	66	61	56	62	60	54	51	56	56	68	
72	72	74	71	72	73	72	75	74	71	74	67	62	63	67	72	75	72.6
80	84	84	77	77	80	79	84	83	77	85	72	67	67	73	82	86	
62	61	64	71	68	69	69	71	70	66	68	64	61	61	61	61	66	74.4
76	76	76	74	72	76	76	74	80	76	78	84	66	66	66	74	82	
66	68	70	70	68	70	68	70	70	66	68	64	60	62	62	62	68	70.9
81	84	82	72	76	78	74	83	84	76	82	66	66	66	75	81	83	
64	71	71	65	68	68	68	69	64	66	68	62	60	60	61	65	67	73.0
86	86	83	76	80	80	80	84	84	78	85	70	67	76	79	81	85	
63	66	67	66	67	67	69	68	63	68	64	61	60	60	61	65	63	73.6
83	84	86	77	86	81	77	80	81	78	83	72	65	67	78	87	89	72.0
57	55	56	61	66	64	65	69	63	62	63	59	59	60	61	59	64	
80	82	83	75	75	78	80	80	82	78	82	72	66	65	71	80	82	72.4
63	62	66	67	68	68	67	70	65	65	68	62	61	61	61	64	66	
83	83	80	73	78	79	78	83	83	77	82	71	63	64	70	80	82	
58	58	62	64	65	67	68	69	65	62	64	61	57	58	58	60	61	71.6
83	88	85	78	80	79	78	85	87	88	87	70	66	68	81	84	85	
68	58	62	64	65	66	67	70	65	63	62	61	58	61	65	66	62	74.1
71	72	74	71	72	75	74	75	76	72	74	68	62	62	65	69	73	73.6
83	88	84	76	84	85	84	80	85	79	82	73	67	68	69	80	84	
62	62	67	64	68	68	70	70	67	65	66	62	58	56	59	61	66	75.0
78	82	83	75	81	83	82	81	84	79	82	72	65	67	69	75	81	
58	57	64	63	63	67	65	69	64	60	61	61	56	56	58	60	62	71.6
82	87	82	77	83	84	82	84	86	80	83	70	67	65	71	80	81	
57	57	64	63	63	67	64	65	64	61	63	60	57	57	59	57	63	73.0
81	87	81	78	83	86	84	84	87	82	85	72	68	65	73	79	84	
61	60	67	67	65	67	68	71	65	67	65	62	59	58	60	61	64	74.8
82	85	82	74	83	83	81	78	83	77	82	71	65	63	69	78	84	
62	60	66	62	61	68	68	70	67	64	65	63	58	58	59	62	65	73.3
88	85	88	84	75	83	84	79	84	85	80	86	70	65	65	75	83	
61	61	66	66	65	68	68	70	66	65	67	63	58	60	61	62	64	74.4
83	86	86	84	79	83	81	86	88	79	86	73	66	66	73	78	81	
61	58	56	67	61	59	56	68	70	68	66	60	56	59	60	61	56	73.3
69	73	73	71	74	73	74	74	71	69	72	66	63	59	63	68	70	72.3
79	85	82	70	79	80	80	81	76	74	78	68	61	59	64	71	76	
57	65	64	64	65	60	66	68	61	66	63	55	53	54	54	61	61	71.2
83	86	82	81	83	83	82	83	78	75	79	75	69	71	68	77	78	
61	64	68	68	71	69	67	73	68	65	70	65	63	60	62	62	65	
78	81	80	76	78	80	80	79	80	74	79	69	63	61	64	75	76	70.8
57	55	62	63	64	64	61	69	65	60	67	62	56	53	58	59	61	
84	87	85	84	86	85	84	76	80	75	78	83	65	63	72	75	81	
56	61	62	64	64	60	66	62	60	64	62	52	53	53	60	60	58	72.0
69	71	72	71	73	75	73	74	73	69	70	68	64	63	65	64	68	71.6
77	80	81	82	83	85	80	83	79	81	80	80	79	73	65	62	72	70.8
60	63	62	62	60	65	62	61	64	60	62	60	55	61	59	52	59	
82	85	87	81	82	86	84	82	85	78	80	75	73	66	72	79	79	
58	56	60	60	66	66	64	69	65	62	61	60	52	56	56	58	60	73.1
79	81	81	77	80	80	80	78	80	73	78	71	70	64	67	76	78	
58	58	61	61	65	67	65	69	65	60	60	62	53	55	56	57	60	70.9

TEMPERATURE — JULY, 1897, SHOWING DAILY MEAN
STATIONS—

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Valley</i>	68	69	74	79	84	79	76	81	82	77	80	70	65	70
Madison Barracks.	69	80	83	90	94	96	90	95	97	93	99	96	74	75
	55	54	58	63	74	67	60	63	70	65	68	60	60	59
Canton.	81	82	92	97	98	91	92	96	95	87	92	70	66	88
	61	56	57	63	74	64	55	68	67	65	68	61	60	62
North Hammond.	84	88	96	98	100	90	94	94	90	90	90	80	66	74
	56	58	60	60	68	68	60	68	66	68	70	66	62	64
Ogdensburg.	77	76	85	90	90	87	95	91	94	85	88	68	72	75
	58	58	61	69	74	67	65	71	70	65	61	62	58	64
Potsdam.														
<i>Great Lakes.</i>	70	71	77	84	84	78	76	78	81	82	78	68	68	68
Westfield.	82	83	91	94	93	94	93	87	90	94	87	79	80	80
	62	61	67	75	74	71	71	69	73	72	67	61	58	57
Buffalo.	80	82	93	91	87	86	92	92	87	95	83	74	79	73
	64	67	70	78	74	72	68	69	76	76	64	64	58	59
Pittsford.	80	82	90	95	98	84	86	91	92	93	89	68	74	75
	58	57	60	70	72	71	61	62	68	69	67	59	58	59
	80	83	90	99	99	87	88	92	94	93	92	68	75	75
Rochester.	59	61	64	73	75	71	65	67	72	72	67	61	61	60
	80	79	86	98	98	85	83	83	87	87	90	73	74	81
Appleton.	56	57	62	69	77	70	57	58	62	69	69	64	57	59
	80	80	88	95	95	87	88	85	90	90	84	75	75	78
Fort Niagara.	58	63	64	73	77	70	63	62	67	70	71	65	60	64
	84	85	90	93	98	87	91	96	95	97	96	72	78	79
Baldwinsville.	60	57	60	74	74	71	66	68	72	71	70	64	63	66
	79	80	90	96	94	87	89	92	93	93	87	72	75	76
Ridgeway.	59	60	70	73	78	70	62	62	69	72	72	64	58	60
	76	79	83	92	94	77	82	86	88	88	89	70	70	74
Oswego.	60	57	62	71	75	67	65	67	72	72	68	64	64	62
	83	83	89	94	94	86	89	94	95	94	91	67	77	72
Palermo.	55	49	57	68	72	67	60	65	69	67	66	63	53	56
	81	82	89	94	95	85	86	92	92	94	92	72	75	75
Lyons.	58	58	68	68	75	71	65	68	72	76	71	63	63	63
	77	80	89	93	90	81	82	87	87	94	82	74	73	73
Erie, Pennsylvania.	65	66	69	76	71	70	68	72	73	73	66	63	60	59
	70	70	75	80	84	77	77	80	82	82	81	68	69	69
Central Lakes.	80	80	87	91	95	82	86	93	91	94	90	72	74	75
Fleming.	69	61	63	71	74	73	68	71	72	73	72	68	62	63
	83	82	91	93	96	85	90	92	94	94	95	71	78	82
Watkins.	56	57	60	70	72	67	63	66	69	69	65	63	62	59
	82	80	91	94	97	86	91	93	94	97	92	71	76	78
Romulus.	58	59	63	66	73	68	66	71	74	69	69	63	61	61
	82	80	88	88	92	84	87	89	93	94	91	71	78	78
Ithaca.	56	59	58	70	73	71	65	69	68	69	71	63	62	61
Penn Yan.														
Mean.	70	70	73	77	81	79	77	78	80	80	78	70	69	70

† Max. and Min. by the Draper Thermograph.
Conduit, nine miles north of city.

|| Received too late to be used in computing

FOR THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
71	72	76	73	74	76	76	76	75	73	72	69	67	60	62	67	66	73.2
80	80	89	87	83	90	86	87	85	80	83	82	85	66	70	69	76	74.2
60	63	62	60	63	63	63	65	64	65	66	61	54	53	56	59	60	
84	88	87	86	86	83	90	83	87	83	78	78	75	63	66	80	73	72.8
59	59	66	55	63	65	61	67	65	64	63	59	58	54	58	59	60	
80	82	95	86	90	86	88	86	84	80	84	76	66	64	64	78	66	73.4
64	62	60	60	60	70	64	70	66	66	64	60	60	56	60	58	60	
78	82	84	83	81	81	88	82	81	80	76	75	75	67	66	74	72	72.2
62	60	65	66	67	68	65	68	68	67	64	60	60	57	59	59	62	
70	72	74	73	74	75	75	76	71	71	72	72	66	64	65	70	71	73.3
80	83	81	81	80	83	85	81	80	74	80	81	73	68	67	80	80	73.7
58	62	65	65	65	63	65	64	65	64	65	64	65	61	59	57	60	
65	86	82	84	82	87	86	80	72	74	75	78	76	68	70	75	78	74.0
65	66	69	65	66	69	69	69	64	64	66	66	64	62	60	62	64	
80	85	84	82	84	85	82	87	78	80	79	78	71	72	68	82	79	72.7
57	58	64	66	64	65	64	68	63	63	66	65	59	59	60	60	62	
79	84	85	82	85	86	88	89	77	80	79	78	71	70	69	83	79	74.0
59	61	68	66	66	68	66	68	63	64	66	65	61	61	60	61	65	
84	80	81	80	80	81	88	88	78	80	82	77	81	70	74	85	78	72.5
56	56	62	63	64	63	61	64	64	67	63	66	63	62	60	57	61	
83	80	83	85	81	85	84	87	85	80	83	81	78	82	71	83	80	74.0
60	63	67	64	61	65	64	64	64	66	63	67	62	62	60	63	64	
81	86	85	86	85	88	88	88	79	82	78	82	69	66	76	82	80	74.4
59	59	65	64	66	67	64	65	65	64	67	67	55	55	59	61	64	
80	83	82	81	79	81	85	86	87	79	81	76	75	69	70	81	79	73.2
59	61	64	63	64	63	65	67	65	64	65	66	62	63	60	59	64	
70	80	79	82	83	84	84	86	74	75	72	77	66	65	70	78	72	72.0
59	62	66	66	67	66	66	68	67	66	68	66	55	59	59	59	62	
82	87	83	82	84	85	83	79	71	75	75	76	65	62	70	72	76	71.6
57	58	62	62	65	66	66	69	65	63	65	64	53	53	55	60	61	
81	84	83	83	83	83	85	88	78	79	80	79	67	72	70	82	79	74.1
59	63	67	65	66	68	65	71	66	65	68	66	58	58	62	63	65	
79	81	78	75	81	84	84	87	73	71	78	76	74	70	71	81	75	73.0
61	66	66	64	65	66	68	65	65	64	64	66	66	61	60	60	64	
70	72	72	74	74	74	74	78	71	71	75	72	62	63	63	71	71	73.2
79	82	81	83	84	82	85	86	78	77	76	79	66	68	69	80	78	73.4
58	61	67	63	66	68	66	68	65	64	67	65	57	57	58	61	65	
84	85	84	85	83	83	82	89	79	80	80	80	67	70	68	85	81	73.2
56	58	53	64	65	66	62	65	63	67	67	67	58	58	57	60	60	
83	87	83	81	83	84	85	88	80	79	95	82	67	70	68	83	80	74.0
58	60	66	63	65	65	63	68	64	64	68	65	57	57	58	61	64	
82	84	81	84	81	81	82	86	74	75	79	73	64	64	68	82	79	72.4
57	57	64	65	66	66	65	68	64	64	68	64	57	57	57	61	64	
69	71	73	72	73	74	74	75	72	70	72	68	63	61	63	68	70	72.1

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City Reservoir. (2a) Intake

DAILY AND MONTHLY PRECIP

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i> ..	T.	0.03	0.00	0.01	0.39	0.11	0.00	T.	T.	0.03	0.45	0.55	0.03	0.13
Alfred ..												*	*	†.41
Angelica ..		.10			.58	.20								.37
Bolivar ..	T.				.94	.45					T.	.78		.17
Friendship ..	T.	T.			.85	.20					.11	.86	.30	.17 ^d
Franklinville ..		.14		.04	.28	.93		T.			1.27	.73	T.	.26
Humphrey ..		.07			2.90						.60	.33	.02	.19
Little Valley ..														
Cherry Creek ..				.12	.45			.02			1.00	.37	.02	.17
Jamestown ..					T.			T.			.51	.69		T.
Elmira ..											.36	.64		.10
Pine City ..		T.									T.	1.32	.02	.19
Akron ..					.50				T.			.50	.08	.32
Avon ..					.04						.90	.35		T.
Mt. Morris ..		T.							T.	.10	.40	.20		.20
Lockport ..										46	T.	.12		T.
Tyrone ..														
Wedgewood ..		T.									.12	.66		.07
Addison ..		T.				.12					.08	.82		.09
Atlanta ..					.60	.02					T.	.56		
Haskinville ..		.10			.30	.16			.06		T.	.85		.10
South Canisteo ..		.02			.40						.10	.70		T.
Arcade ..		.08			.54	.12		T.		T.	2.97	.35	.12	.27
<i>Eastern Plateau</i> ..	T.	T.	0.00	0.00	0.00	0.21	0.03	T.	0.00	T.	0.04	0.83	0.17	0.35
Binghamton (1) ..							.08					.22	.03	
Binghamton (2) ..	T.	T.				T.					.14	.29	T.	T.
Chenango Forks ..												.70		
Oxford ..								T.		T.	T.	.76	.04	T.
Cortland ..												.74		.13
South Kortright ..						.96						*	†1.28	
Bouckville ..														
Middletown ..					.10							*	†2.57	.27
Port Jervis ..					.83	.14					.18	.92	.32	.56
Warwick ..		.08				.34	.09					1.85	1.65	1.83
Cooperstown ..					.22					.03		T.	.73	.44
Garrattsville ..					.23						*	†.63		
New Lisbon ..					.26							.79	.12	.04
Oneonta ..											.24	.73		.32
Schenenav ..						.16	.02				.01	.58	.23	.40
Perry City ..											.07	.63		.07
Newark Valley ..											T.	.70		.08
Straits Corners ..		T.									T	1.23		.02
Waverly ..		.01										.84		
Dryden ..											.06	1.00	T.	.07
Mohonk Lake ..						1.17	.30					1.46	.26	3.23
<i>Northern Plateau</i> ..	T.	0.00	0.00	0.00	0.02	0.82	0.04	0.00	0.00	0.06	0.62	0.89	0.64	0.60
Elizabethtown ..						5.25					*	*	†2.70	1.70
Saranac Lake ..	T.				.12					.33	1.33	.38	2.00	.12
Gloversville ..						.48	.04				1.85	1.58	.68	.28
Little Falls (2a) ..							.25				.15	.80	.24	.25
North Lake ..												.25	.32	.15
Elizaville ..						.05					.26	.25	.18	.05
Number Four ..						.12				.12	*	†.98		.89
Kings Station ..						.62					.10	2.10	1.05	1.40
<i>Atlantic Coast</i> ..	0.01	0.25	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.16	2.75	1.42
Brooklyn ..		.75									.14		2.75	1.48
Manhattan Beach ..			.66									.10	1.10	2.32
New York City ..		.48	T.								.10	.06	1.78	1.39
Willels Point ..	.10											1.10	2.20	.30

TATION FOR JULY, 1897—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.01	0.05	0.02	0.24	0.14	0.40	0.05	0.17	0.56	0.17	0.06	0.41	0.56	0.21	0.28	0.03	0.03	5.08
.....01	.....	.....	.36	.....	.26	.27	.38	.....	.....	1.99	.....	.57	.01	.....	5.14
.0307	.04	.94	.22	.12	1.30	.14	.13	.11	.39	.15	.22	.22	.09	.....	6.36
.03	T.	T.	.23	.05	T.	.13	.13	.50	.23	T.	.11	.31	.02	.24	T.	.....	4.47
.....01	.01	.76	.21	T.	.14	.32	.14	.....	.06	.24	.05	.29	T.	.....	5.88
T.	T.	.02	.36	.60	.50	.12	.32	.78	.03	T.	.38	.10	.13	.24	.08	.....	7.77
.....08	1.02	.36	.38	.08	.15	.58	.08	.....	.43	.19	.24	.40	T.	.09	6.23
.....51	.63	1.59	.....	.....	.44	.90	.11	.....	T.	.21	.04	.05	.....	.25	5.93
.....33	.14	.....	.17	.08	.97	.24	.08	.12	.....	3.23
.05	T.	.02	.....	T.	.....	.....	.30	.33	.09	.05	.87	1.13	.35	.33	.05	.....	5.10
T.	T.	T.	.33	T.	T.	T.	T.	1.53	.05	T.	*	+ .90	.12	.20	T.	T.	4.03
.....17	.....	.58	.....	.....	.20	.26	.35	.09	.27	.52	.18	.11	.06	.....	4.08
.....	T.	T.	.10	.....	T.	T.	.....	.20	.39	T.	.....	.50	T.	.10	.....	.....	2.20
.....32	.....	.....	.....	.67	.....	.....	1.00	.27	.....	.46	.....	.....	3.30
.....	1.00	.03	.....	.....	.....	.....	.13	.....	.....	.....	.....	1.00	.40	.35	.....	.....	2.91
.....03	.....	.26	.....	.....	.12	.27	.50	T.	.15	.57	.34	.23	.11	.....	3.43
.....	T.	.88	.....	.12	.15	.10	.42	.04	.02	.20	.86	.41	.17	.02	.02	4.52
.....04	.22	.....	.35	.....	.28	.45	.72	.24	2.87	.54	.35	.20	.03	.....	7.47
.1010	.....	.28	.....	.....	.45	.20	.30	1.00	.37	.67	.38	.10	.....	.....	5.56
.....40	.....	1.92	.22	.17	.50	T.	.15	.10	.60	.07	.25	T.	.....	.....	5.62
.....06	.31	.06	.48	T.	.32	1.42	.06	.....	.35	.21	.06	.57	.....	.....	8.35
0.02	T.	0.10	0.09	0.04	0.21	0.19	0.25	0.50	0.45	0.33	0.22	0.61	0.80	0.30	0.12	0.05	6.07
.02	T.	T.	T.	T.	.24	.27	.08	.15	.55	.70	.11	.09	.....	2.54
.07	T.	.02	T.	T.	.07	.12	.03	.01	.73	.55	.16	.11	.....	2.30
.1080	.....	.....	.....	.65	1.00	.....	.....	1.00	.60	.....	.....	.....	4.85
T.	1.18	.....	.12	.40	.05	T.	.73	1.95	.48	.08	.57	1.28	.20	.18	.02	8.04
.....	T.	.....	.....	.62	T.	.37	.44	.74	.....	.26	.77	.21	.12	.06	T.	4.46
.....30	*	*	.....	.....	.....	.....	*	*	+2.00	*	+1.14	5.56
.....
.....47	.....	.75	1.00	*	*	*	*	*	*	*	*	+3.64	.34	.....	9.14
.....70	.....	.....	.....	.....	1.10	.49	.31	.91	2.88	.25	.....	.....	.14	.....	9.23
.....	T.	.40	.51	.13	.28	.32	.44	.40	.13	.19	.29	1.65	.38	.....	.14	11.10
.....	T.	.03	.25	.45	.02	.10	.46	.20	.10	.10	.22	1.23	.08	.03	.13	4.86
T.	T.	.23	.....	.15	1.67	.36	.29	.23	.08	.....	.....	1.63	.66	.....	T.	6.21
.....10	.....	.04	.....	.....	.10	.84	.71	.35	.06	.14	1.46	.46	.10	.01	5.58
.....	T.	T.	T.	.42	.75	1.10	.41	.04	.27	2.11	.12	.....	.....	6.61
.0807	T.	T.	.....	.27	.29	.51	.21	.08	.....	.14	1.25	.65	.40	.....	5.35
.....	T.	T.	.....	.10	.....	.10	.97	.08	.14	.04	.57	.25	.10	.43	.....	3.55
.....	T.	T.	.35	.06	.12	.43	.15	T.	.50	1.10	.26	.55	.13	T.	.....	4.43
.....01	.....	.36	.22	.03	.....	T.	1.39	.28	.30	.10	.....	.....	4.04
.03	T.	.02	.....	.....	.21	T.	.38	.51	.54	T.	.08	.82	.15	.15	.14	.36	4.30
.....65	.....	*	+ .73	.....	.61	.66	2.80	.....	*	+2.14	1.21	.....	.09	.....	14.71
0.06	0.00	0.35	0.01	0.05	0.16	0.14	0.16	0.18	0.29	0.46	0.21	0.08	0.54	0.67	0.04	0.29	7.36
.....80	.07	.24	.18	.....	1.00	.....	1.00	.....	.15	.....	.....	1.00	.20	.....	13.00
.47	T.	.18	T.	.17	.11	.03	2.32	.07	.03	.14	.82	.39	.....	.84	8.55
.....	T.	T.	.21	.05	.82	.22	.21	.75	.....	.25	.71	.16	.03	.21	.....	5.31
.....	1.50	.....	.....	.32	.05	.65	.64	.15	.....	.04	.13	.59	.27	.....	.29	4.15
.....15	.....	.....	.27	.....	.02	.14	.40	.48	.04	.05	.27	.12	.12	.11	2.96
.....01	.....	.....	.....	.02	.16	.02	.16	.89	.....	.....	2.45	.....	.64	6.46
.....35	.15	.08	.....	.14	.65	.....	.....	.50	.....	.....	1.00	.60	.....	.09	8.83
0.06	0.00	T.	0.70	0.06	0.43	0.40	0.84	0.64	0.16	0.21	0.07	0.18	1.21	1.29	0.02	0.03	11.20
.3253	.05	.18	.80	.65	.83	.43	.23	T.	.18	.75	1.23	T.	.08	11.06
.0630	.06	.54	.48	.22	.44	.28	.34	.01	.20	1.14	.....	T.	.....	8.51
.....	1.06	.61	.04	.32	.65	.66	.08	.03	.06	.15	1.51	1.06	T.	.02	.....	9.52
.....90	.07	1.10	.35	.20	1.45	.05	.40	.15	.15	1.15	.08	.....	.....	.....	9.75

DAILY AND MONTHLY PRECIPITA

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan. Coast (Con.)</i>														
Brentwood.....		.20											2.20	.30
Setauket.....		.11											6.07	2.53
Bedford.....		.10									.03	.02	2.82	2.22
Primrose.....		.31									.08	T.	3.11	.78
<i>Hudson Valley....</i>	T.	0.50	0.06	0.00	T	0.30	0.18	T.	0.00	T.	0.01	0.84	1.44	2.21
Albany.....						.04	.01			T.	.22	.57	.49	3.11
Cedar Hill.....			.01			.20	.02	T.			.01	.86	.43	2.77
Honeymead Brook.....						2.20	.63				T.	1.14	2.87	2.24
Poughkeepsle.....						.04	.75				T.	2.25	.94	.06
Wappinger's Falls.....		T.				.08	.10				T.	2.23	1.81	2.03
Catskill.....						T.	.15					.63	*	+2.16
West Point.....	.05		.60			T.						T.	3.10	3.70
Boyd's Corners.....														
Carmel.....		5.03									.06		2.25	2.47
Southeast Reserv'r.....														
Eagle Mills.....					.05							.40	.60	1.00
Easton.....						.48	.18					.35	.48	2.53
<i>Mohawk Valley....</i>	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.02	0.05	0.80	0.32	0.20
Little Falls (la).....							.09					.77	.27	.07
Canajoharie.....						.28				T.	.09	1.29	.69	.29
St. Johnsville.....						.11	.06			.06		.79	.32	.33
Rome.....						.11	.06				.12	.33		.11
<i>Champlain Valley..</i>	0.00	0.00	0.00	0.00	0.00	0.20	0.01	0.00	0.06	0.00	0.15	1.16	0.43	2.22
Plattsburgh Barr'ks.....						.24						1.00	.51	1.15
Ticonderoga.....														
Glens Falls.....						.20			.15		.31	1.19	.36	2.63
Lake George.....						.15	.02		.04		.12	1.29	.42	2.88
<i>St. Lawrence Valley</i>	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.73	0.22	T.
Madison Barracks.....													.30	
Watertown.....														
Canton.....	.21										1.07	.54		T.
DeKalb Junction.....											.35	1.40		
North Hammond.....												.15	.80	
Ogdensburg.....	T.											1.55	T.	
Potsdam.....														
<i>Great Lakes.....</i>	T.	T.	0.00	0.01	0.09	0.04	0.00	0.00	0.00	0.05	1.14	0.34	0.14	0.20
Westfield.....				.15							3.05		T.	.57
Buffalo.....	T.	T.			.06	T.					2.02	.08	T.	.84
Adams Centre.....					.42						1.52			
Pittsford.....		T.			.50					T.	2.15	.12		.32
Rochester.....		T.			.14					.01	3.26	.33		.31
Scottsville.....					.05					.10	1.05	.72		T.
Appleton.....										.03	1.94	.66		.03
Fort Niagara.....					.25						.23		.38	.13
Niagara Falls.....		T.				.17					.72	.08		.42
Baldwinsville.....											.13	.46	1.84	
Skaneateles.....											.30	.51	.03	.12
Lyndonville.....										.20	.60	1.40		.23
Ridgeway.....										.65	.42	.38		.30
Fulton.....														
Oswego.....					T.	T.					.42	.14	T.	.01
Palermo.....					T.	.43					*	1.19	.21	*
Phoenix.....					.03						.58	.45	.18	
Lyons.....					.05						1.68	.12		.05
Rose.....					.25	.01					.56	.48		.19
Erie, Pennsylvania						.19					T.	.15	.07	.01

TATION FOR JULY, 1897 —(INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.	
.....80	.....	.70	.60	1.20	.50	.30	.....	T.	.40	*	+2.80	.....	.....	10.00	
.....30	T.	1.36	.34	2.04	.65	T.	.....	.....	.18	1.25	3.35	.....	.....	18.18	
.1363	.02	.....	.22	.74	.54	.02	.13	.03	.14	1.34	2.17	.01	.11	11.42	
.....	T.	1.42	T.	.02	.....	.78	.31	T.	.62	T.	.22	2.30	.02	.13	.....	11.12	
0.48	T.	0.02	0.12	0.12	0.07	0.06	0.63	0.47	0.14	0.06	0.15	0.06	1.04	1.05	0.04	0.03	10.35	
.01	T.	.....	.....	.08	T.	.52	.22	.01	.06	.02	.02	.84	.64	.....	T.	6.67	
.1504	T.	T.	.10	.....	.86	.12	.03	.14	.04	.01	.95	.72	T.	T.	7.46	
.....02	.12	.....	.38	.69	1.41	.03	.07	.05	.03	2.12	.44	.07	.04	14.55	
1.58	.03	.15	.35	.03	.01	.03	.49	1.21	.02	.02	.05	.12	.13	1.09	.....	.02	9.37
.....02	.30	.06	T.	.22	.26	.39	.10	.22	.28	.16	2.61	.71	.01	.16	11.84
2.6502	.....	.....	1.05	.11	.09	.06	.....	.15	*	+2.75	.....	.....	9.82	
.1020	.20	.....	.....	1.00	.05	.40	.05	.80	.05	.10	2.50	.10	.05	13.05	
.....	12.51	
.....24	.67	.....	T.	1.24	.45	T.	T.	.14	.09	.55	3.38	T.	.07	16.64	
.....55	.250192	.02	.25	T.	11.15
.3315	.48	.....	.21	.19	.45	.08	.13	T.	1.10	.....	.....	.....	7.09	
0.01	0.00	0.00	T.	T.	0.92	0.34	0.44	0.18	0.18	0.54	0.05	0.09	0.68	0.16	0.01	0.06	5.19	
.....73	.32	.51	.27	.40	.19	.....	.10	.69	.15	.....	.09	4.68	
.....02	T.	.89	.43	.20	.17	.02	.96	.....	T.	.95	.17	.....	.03	6.48	
.0302	.20	.50	.67	.16	.14	.75	.05	.....	.31	.08	.03	.06	4.67	
.....	1.85	.10	.35	.14	.15	.25	.16	.26	.76	.26	.....	.08	4.92	
0.05	0.02	0.25	T.	0.11	0.57	0.05	0.12	0.12	0.95	0.38	0.07	T.	0.57	0.64	0.02	0.05	8.28	
.....11	.....	.....	.....	2.30	.75	.20	.....	.....	*	+ .93	.....	7.19	
.....7502	.6413	.28	.21	.4078	.60	T.	.05	8.82
.14	.05	T.	T.	.30	.95	.15	.23	.08	.33	.....	T.	T.	.94	.60	.03	.10	8.83
0.00	0.05	0.00	0.18	0.17	0.23	0.01	0.14	0.13	0.30	0.03	0.17	0.10	0.94	0.76	0.09	0.20	4.78	
.....	.25	.....	.....	.15	.....	.....	.....	.40	.10	.10	.....	.20	.15	.40	.20	.30	2.55
.....02	.52	.14	T.	.32	T.	.52	.....	.48	.05	1.36	1.05	.06	.34	7.58	
.....49	T.	.....	.01	.14	.04	.30	.13	1.03	.79	.....	.16	4.84	
.....	T.	.....	.10	.07	.36	.08	.44	.....	.05	.04	1.20	.90	.09	.15	4.32	
.....30	.44	.....	.....	.03	.18	.30	.....	T.	*	*	*	+1.85	.07	4.62	
.....	
0.17	T.	0.14	0.37	0.16	0.34	0.44	0.18	0.43	0.33	0.06	0.34	0.72	0.30	0.17	0.13	0.08	6.03	
.....	T.	.34	.23	1.90	.18	.46	.24	.05	.....	.02	.62	.64	.14	.12	.....	8.21	
T.	T.	1.34	.24	.01	T.	.35	1.11	T.	T.	.57	.98	.10	.16	T.	.40	8.29	
.....	1.27	.....	.02	.37	.....	.46	.20	2.30	.50	.27	.08	.37	.38	.02	.04	8.22	
.6002	.....	T.	.01	.....	.10	.54	.19	.02	.17	.71	.72	.15	.05	.....	6.37	
T.	T.	.02	T.	.....	.02	.21	.63	.07	.13	.34	.72	.13	.05	.....	6.37	
T.14	.44	.....	1.65	.....	.17	.24	.19	.20	.30	.30	.70	.23	.10	.....	6.58	
.....	T.	.13	.07	.....	.....	.15	.20	.03	.02	.03	1.45	.05	.23	T.	.06	5.08	
.....	
.....	2.00	.12	.....	.....	.15	.40	.....	.....	2.50	.43	.....	.15	.27	.....	7.01	
T.	T.	1.02	.32	.04	.34	.09	.63	.....	.02	T.	2.34	.06	.41	.07	.....	6.73	
.....28	.....	.....	.93	.....	.22	.81	.....	.....	.17	.79	.16	.09	.04	.03	5.95	
.0260	.03	.....	.13	.....	.05	1.00	.11	.25	.32	.64	.24	.04	.50	.03	4.92	
.....08	.05	.99	.....	.12	T.	.....	+ .58	.....	.....	.....	.11	.....	.04	4.63	
.....02	.59	.45	.....	.....	.....	1.21	.13	.14	.08	5.51	
.....	
.....	T.	.....	.01	.51	.....	.60	.10	.30	T.	.....	.31	.47	.04	.21	.03	3.15	
+ .26	*	+ .40	.10	.15	.05	.38	.01	T.15	.53	.15	.21	T.	4.22
2.06	.0309	.05	2.03	.09	.02	1.27	.01	T.	T.	.29	.70	.14	.51	.03	8.56
.....	
.0301	.03	.15	T.	.07	.05	1.05	.0969	.60	.10	.36	T.	5.04
.2917	T.2411	.23	.0910	.34	.51	.09	.16	.02	3.84
.....03	1.55	.30	.20	.02	.20	.16	.....	.....	1.13	.91	T.	.03	T.	.86	5.81	

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.00	T.	0.00	0.00	0.00	T.	0.00	0.00	0.00	0.18	0.18	0.75	0.01	0.15
Fleming .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.45	.68	.....	.23
Sherwood .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.91	.....	.45	.02	.19
Watkins .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.71	.....	T.
Romulus .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.27	.88	.....	T.
Ithaca .....	.....	T.	.....	.....	.....	T.	.....	.....	.....	.....	.06	1.01	.03	.36
Average.....	T.	0.08	0.01	T.	0.05	0.18	0.03	T.	0.01	0.03	0.30	0.70	0.62	0.75

* Record for the month incomplete. || Received too late to be included in the averages.
 † Omitted from values at other stations.

TATION FOR JULY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	Total.
0.01	0.00	0.12	0.02	0.03	0.02	0.01	0.12	0.52	0.20	0.07	0.35	0.35	0.19	0.21	0.26	0.01	3.76
.....	.....	.43	T.	.....	T.	.....	.25	.43	.49	T.	.90	T.	T.	.....	.....	...	3.86
.....	.....	.17	.....	.15	.03	.07	.07	.90	.14	.13	.51	.07	.08	.33	.11	.03	4.36
.03	.....	.....	.12	.....	.04	.....	.05	.70	.22	.05	.05	.46	.30	.30	.14	....	3.19
.....	.....	.....	.....	.....	T.	.....	.09	.21	.16	.16	.12	.71	.57	.33	.64	T.	4.14
.....	.....	T.	.....	.....	.02	.....	.14	.37	T.	T.	.15	.50	.11	.10	.40	....	3.25
0.09	0.01	0.10	0.17	0.09	0.34	0.14	0.30	0.37	0.32	0.22	0.20	0.28	0.65	0.55	0.08	0.08	6.81

* Amount included in next measurement. † Not included in computing averages. § Interpo-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE — (DEGREES FAHR.).									
		Normal for the month of July.	Length of record, years.	Record begins.	Record ends.	Mean for July, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR JULY.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		69.1	..	..	..	71.5	+2.4	..	..	..	..
Angelica.....	Allegany	67.9	15	1854	1897	70.7	+2.8	72.7	1854	60.9	1891
Humphrey.....	Cattaraugus..	67.9	15	1883	1897	69.5	+1.6	75.1	1887	62.8	1884
Elmira.....	Chemung	71.7	19	1851	1897	74.4	+2.7	75.6	1854	66.3	1851
<i>Eastern Plateau.</i>		68.0	..	..	..	71.2	+3.2	..	..	..	..
Oxford.....	Chenango	68.3	30	1828	1897	71.0	+2.7	72.1	'47-'54	61.0	1829
Cortland.....	Cortland.....	66.6	36	1829	1897	70.8	+4.2	70.9	1830	63.2	1860
Cooperstown.....	Otsego	68.0	44	1854	1897	70.5	+2.5	76.0	1868	62.7	1860
Waverly.....	Tioga	69.3	16	1882	1897	72.6	+3.3	74.5	1887	65.6	'84-'91
<i>Northern Plateau.</i>		69.8	..	..	..	70.6	+0.8	..	..	..	..
Lowville.....	Lewis	69.8	31	1827	1897	70.6	+0.8	71.8	1847	62.1	1891
<i>Atlantic Coast.</i>		72.6	..	..	..	72.7	0.0	..	..	..	..
New York City.....	New York.....	73.4	27	1871	1897	73.0	-0.4	76.7	1887	70.1	1884
Setauket.....	Suffolk	71.9	13	1885	1897	72.4	+0.5	75.4	1887	68.9	1891
<i>Hudson Valley.</i>		71.8	..	..	..	73.7	+1.9	..	..	..	..
Albany.....	Albany	72.6	24	1874	1897	75.0	+2.4	76.6	1887	69.1	1891
Honeymead Brook.....	Dutchess.....	69.8	17	1881	1897	71.6	+1.8	74.0	1887	66.8	1891
West Point.....	Orange	73.0	69	1826	1897	74.4	+1.4	..	..	..	..
<i>Champlain Valley.</i>		69.7	..	..	..	70.8	+1.1	..	..	..	..
Plattsburgh Barracks.	Clinton.....	69.7	41	1839	1897	70.8	+1.1	73.8	'47-'70	65.2	1891
<i>St. Lawrence Valley.</i> ...		70.2	..	..	..	73.5	+2.6	..	..	..	..
Madison Barracks.....	Jefferson.....	70.1	36	1839	1897	74.2	+4.1	78.2	1887	65.1	1884
Canton.....	St. Lawrence.	71.0	34	1862	1897	72.8	+1.8	78.2	1868	63.6	1863
North Hammond.....	"	71.5	19	1866	1897	73.4	+1.9	79.9	1868	65.1	1891
Potsdam.....	"	68.2	27	1828	1896	..	..	73.6	1838	63.3	1833
<i>Great Lakes.</i>		69.9	..	..	..	73.3	+3.4	..	..	..	..
Buffalo.....	Erie.....	70.0	27	1871	1897	74.0	+4.0	74.9	1887	64.9	1884
Rochester.....	Monroe.....	70.7	26	1871	1897	74.0	+3.3	74.2	1887	65.1	1884
Fort Niagara.....	Niagara.....	70.9	41	1842	1897	74.0	+3.1	75.6	1887	66.4	1884
Baldwinsville.....	Onondaga.....	69.7	30	1854	1897	74.4	+4.7	74.4	1897	64.6	1865
Oswego.....	Oswego.....	69.2	27	1871	1897	72.0	+2.8	74.5	1878	64.5	1884
Palermo.....	"	67.7	44	1857	1897	71.6	+3.9	79.1	1868	62.9	2884
Erie, Pennsylvania...	Erie.....	71.3	24	1874	1897	73.0	+1.7	76.0	1887	66.0	1891
<i>Central Lakes.</i>		70.0	..	..	..	72.4	+2.4	..	..	..	..
Ithaca.....	Tompkins.....	70.0	19	1879	1897	72.4	+2.4	74.8	1887	66.0	1884
Average departure..		..	..	..	..	..	+2.4	..	..	..	..

AND PRECIPITATION — JULY.

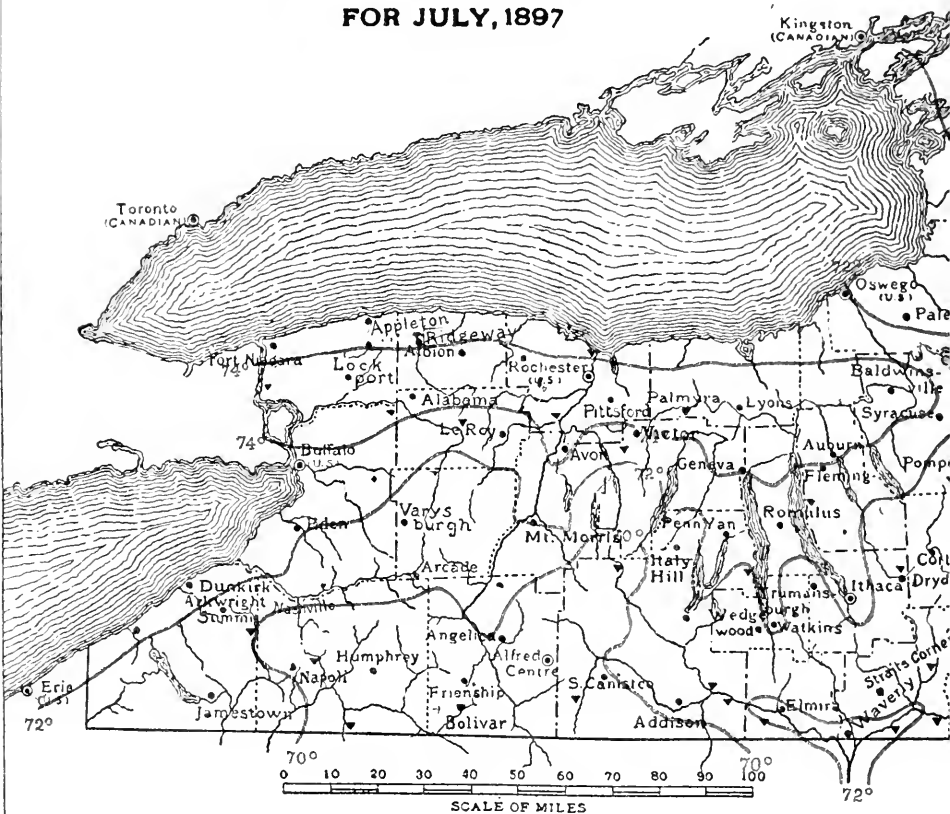
STATION.	COUNTY.	PRECIPITATION — (INCHES.)									
		Average for the month of July	Length of record, years.	Record begins.	Record ends.	Total for July, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR JULY.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount	Year.
<i>Western Plateau.</i>.....	.....	3.75	..	.....	.....	5.38	+ 1.63	.....	.....	.....	.....
Angelica.....	Allegany.....	3.63	11	1871	1897	5.14	+ 1.51	5.66	1896	1.79	1893
Humphrey.....	Cattaraugus.....	4.52	15	1883	1897	7.77	+ 3.25	7.77	1897	2.38	1885
Elmira.....	Chemung.....	3.11	19	1851	1897	3.23	+ 0.12	5.55	1896	1.40	1853
<i>Eastern Plateau.</i>.....	.....	4.48	..	.....	.....	6.22	+ 1.74	.....	.....	.....	.....
Oxford.....	Chenango.....	4.12	27	1829	1897	8.04	+ 3.92	8.29	1844	0.70	1892
Cortland.....	Cortland.....	4.78	19	1851	1897	4.46	- 0.32	8.45	1863	1.79	1861
Cooperstown.....	Otsego.....	4.28	44	1854	1897	4.86	+ 0.58	7.92	1863	0.89	1868
Port Jervis.....	Orange.....	5.42	13	1880	1897	0.23	+ 3.81	9.23	1897	1.83	1894
Waverly.....	Tioga.....	3.79	16	1882	1897	4.50	+ 0.71	7.19	1887	1.58	1895
<i>Northern Plateau.</i>.....	.....	3.53	..	.....	.....	2.96	- 0.57	.....	.....	.....	.....
Lowville.....	Lewis.....	3.53	35	1827	1897	2.96	- 0.57	8.29	1848	0.70	1892
<i>Atlantic Coast.</i>.....	.....	4.66	..	.....	.....	13.85	+ 9.19	.....	.....	.....	.....
New York City.....	New York.....	4.46	27	1871	1897	9.52	+ 5.06	9.63	1889	1.26	1893
Setauket.....	Suffolk.....	4.87	13	1885	1897	18.18	+ 13.31	18.18	1897	0.63	1894
<i>Hudson Valley.</i>.....	.....	4.59	..	.....	.....	11.23	+ 6.64	.....	.....	.....	.....
Albany.....	Albany.....	4.18	24	1874	1897	6.67	+ 2.49	6.78	1874	1.80	1893
Honeymead Brook ..	Dutchess.....	5.28	17	1881	1897	14.55	+ 9.27	14.55	1897	2.23	1882
Poughkeepsie	".....	3.88	22	1830	1897	9.37	+ 5.49	9.37	1897	0.49	1849
West Point.....	Orange.....	4.69	50	1840	1897	13.05	+ 8.36	13.05	1897	1.04	1894
Boyd's Corners.....	Putnam.....	4.90	27	1870	1897	12.51	+ 7.61	13.32	1887	1.75	1894
<i>Champlain Valley.</i>.....	.....	3.52	..	.....	.....	7.19	+ 3.67	.....	.....	.....	.....
Plattsburgh Barracks.	Clinton.....	3.52	38	1840	1897	7.19	+ 3.67	9.18	1874	0.95	1849
<i>St. Lawrence Valley.</i>..	.....	3.54	..	.....	.....	3.44	+ 0.18	.....	.....	.....	.....
Madison Barracks.....	Jefferson.....	2.94	26	1841	1897	2.55	- 0.39	7.67	1851	0.38	1881
North Hammond.....	St. Lawrence	3.58	19	1866	1897	4.33	+ 0.75	10.31	1873	1.00	1868
Potsdam.....	".....	4.10	26	1828	1896	.....	.....	7.87	1889	1.10	1841
<i>Great Lakes.</i>.....	.....	3.03	..	.....	.....	5.81	+ 2.78	.....	.....	.....	.....
Buffalo.....	Erie.....	3.49	27	1871	1897	8.29	+ 4.80	8.29	1897	1.19	1882
Rochester.....	Monroe.....	3.18	26	1871	1897	6.37	+ 3.19	6.37	1897	1.07	1886
Fort Niagara.....	Niagara.....	2.77	41	1842	1897	7.01	+ 4.24	7.01	1897	0.62	1882
Oswego.....	Oswego.....	3.23	27	1871	1897	3.15	- 0.08	7.62	1874	1.12	1882
Palermo.....	".....	2.41	38	1860	1897	4.22	+ 1.78	6.60	1874	0.64	1882
Erie, Pennsylvania....	Erie.....	3.06	25	1873	1897	5.81	+ 2.75	7.03	1874	0.76	1890
<i>Central Lakes.</i>.....	.....	3.74	..	.....	.....	3.25	- 0.49	.....	.....	.....	.....
Ithaca.....	Tompkins.....	3.74	19	1879	1897	3.25	- 0.49	6.73	1889	1.24	1890
Average departure..	.....	.....	.....	.....	.....	.....	+ 3.26	.....	.....	.....	.....

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR JULY, 1897



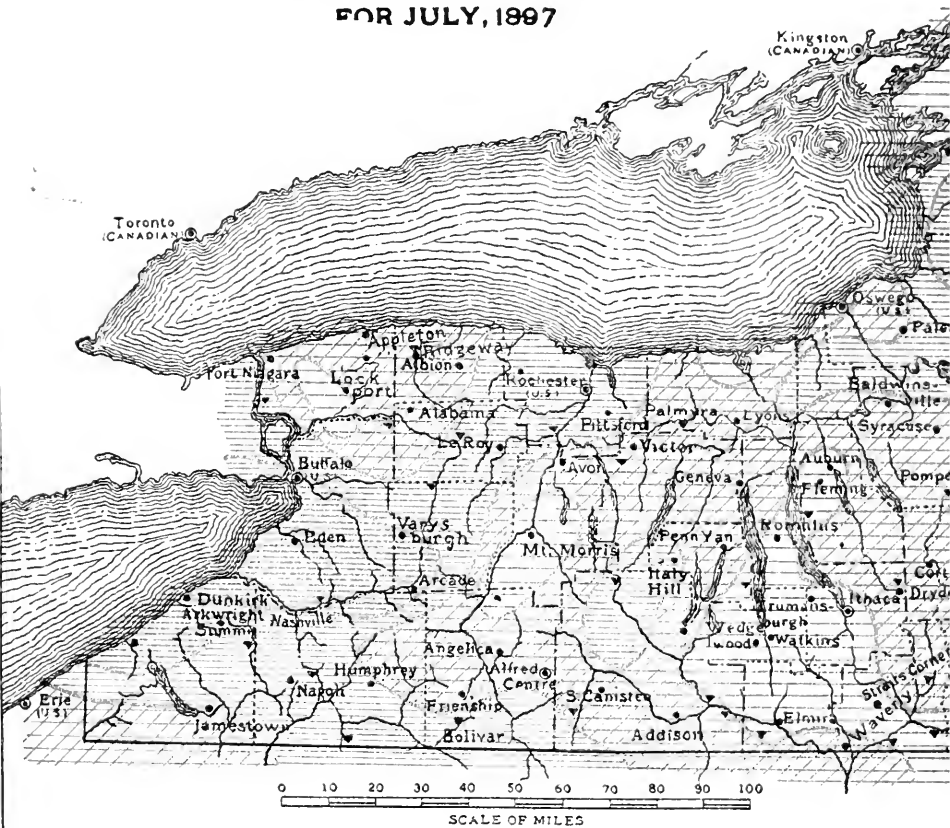


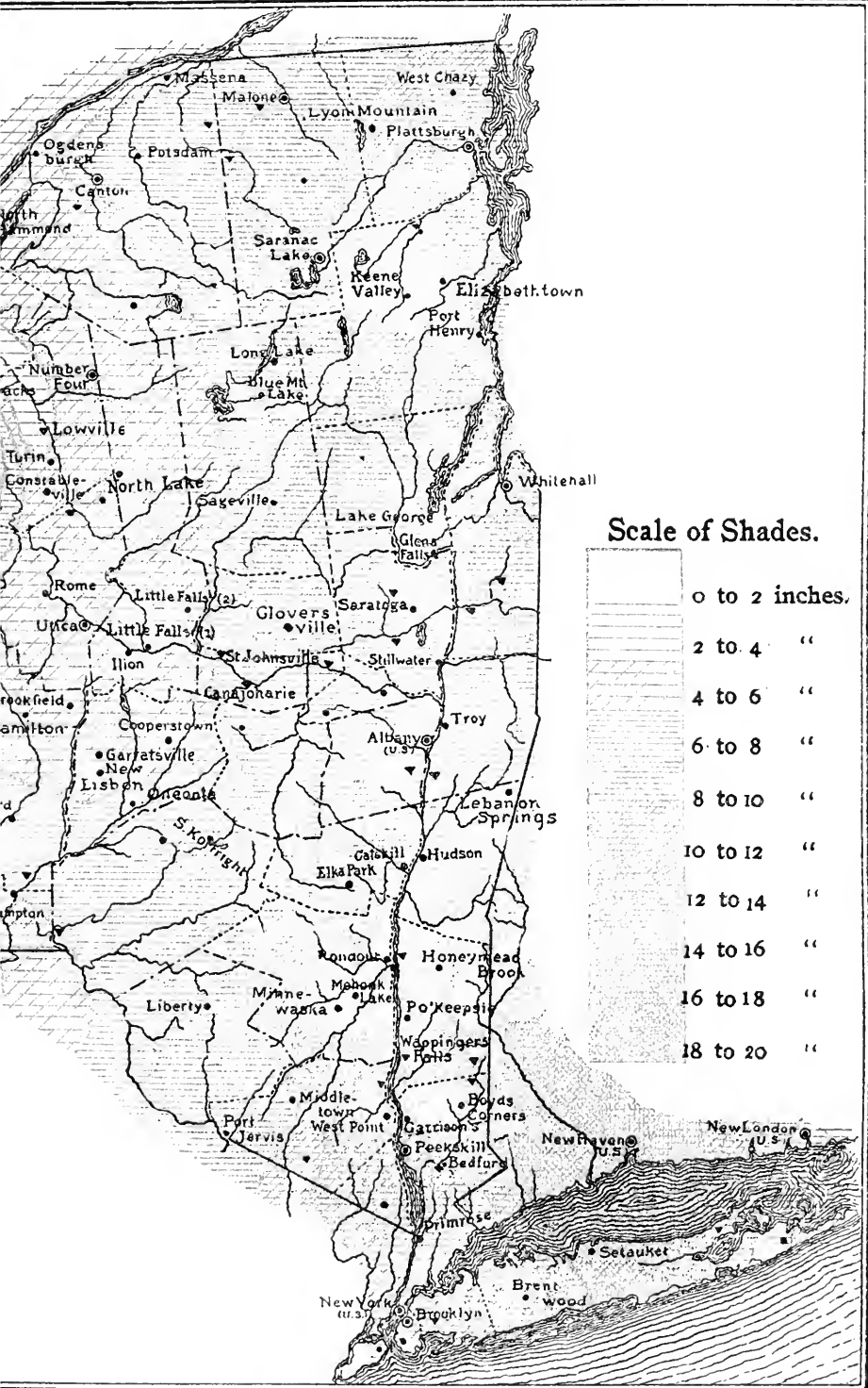
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR JULY, 1897





Meteorological Summary for August, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fah.) for the State, was 29.93 inches. The highest barometer was 30.27 inches at Erie, Pa., on the 6th, and the lowest, 29.62 inches, at Ithaca and Oswego, on the 11th. The highest mean pressure obtained along the eastern border, and the lowest in the western central section. The average pressure at 6 stations of the National Bureau was 0.02 inches below normal, the values being deficient excepting at Oswego and Erie.

The mean temperature of the State was 66 degrees, as obtained from observations of maxima and minima at 79 stations. The highest local mean was 71.9 degrees at Brooklyn, while the lowest was 60.2 degrees at Number Four. The highest general daily mean was 73 degrees on the 4th and 15th, the lowest being 60 degrees on the 20th. The maximum temperature reported was 99 degrees at Mt. Morris on the 3d, and the minimum, 34 degrees, at South Canisteo on the 21st. The mean monthly range of temperature for the State was 41 degrees; the greatest local range being 59 degrees at Mt. Morris, and the least, 24 degrees, at New York city. The mean daily range was 21 degrees; greatest, 48 degrees at Madison Barracks on the 23d, least, 3 degrees at West Point on the 9th. The mean temperatures of the various sections were as follows: The Western Plateau, 64.5 degrees; the Eastern Plateau, 65.0 degrees; the Northern Plateau, 61.9 degrees; the Atlantic Coast, 70.0 degrees; the Hudson Valley, 68.6 degrees; the Mohawk Valley, 65.9 degrees; the Champlain Valley, 65.7 degrees; the St.

Lawrence Valley, 64.9 degrees; the Great Lakes, 66.6 degrees; the Central Lakes, 66.9 degrees. The average temperature at 24 stations possessing records for previous years was 1.7 degrees below the normal. Deficiencies obtained in all regions, but were greatest in northern New York.

The mean relative humidity was 76 per cent. The mean dew point was 59 degrees.

The average precipitation for the State was 3.06 inches, as derived from the records of 103 stations. The rainfall exceeded 4 inches in much of eastern New York, while near Lake Ontario and the Genesee valley the amount was under two inches. The greatest local precipitation was 6.60 inches at Cooperstown, the least being 0.20 inches at Mt. Morris. A list of the heaviest rates of rainfall will be found in the Table of Meteorological Data. The rainfall for the State was 0.28 inches below the normal amount, as derived from the records of 25 stations possessing records for previous years. The amounts were in excess through the Hudson and Champlain Valleys, and deficient in the western section.

The average number of days on which the precipitation amounted to 0.01 inches or more was 9.6. The number of rainy days was greatest in the Northern Plateau and the Champlain Valley, and least in the vicinity of the Great Lakes. The average number of clear days was 13.3; of partly cloudy days, 11.5; of cloudy days, 6.2, giving an average cloudiness of 43 per cent. The maximum cloudiness obtained in northern New York, and the minimum in the eastern-central section.

The prevailing winds were from the west. The average total wind travel at 6 stations of the National Bureau was 6,290 miles, the values being in excess of the usual mileage for August. The maximum velocity recorded was 49 miles per hour at New York city on the 22d.

Electrical storms (including distant thunder or lightning), were reported as follows, by regions: In the western highlands, on the 3d, 4th, 8th, 9th, 10th, 11th, 12th, 15th, 16th, 19th, 22d, 23d, 25th, 30th; the eastern highlands, 4th, 6th, 9th, 10th, 11th, 12th, 15th, 16th, 19th; northern highlands, 9th, 10th, 15th, 29th; Atlantic Coast, 4th, 5th, 10th, 12th, 15th, 16th, 17th, 18th, 22d, 25th; Hudson Valley, 4th, 10th, 11th, 12th, 15th, 16th, 19th, 22d, 25th; Mohawk Valley, 8th, 10th, 12th, 15th, 19th; Champlain Valley, 4th, 9th, 10th, 11th, 12th, 15th, 16th, 19th, 25th; St. Lawrence Valley, 10th, 11th, 12th, 16th, 19th, 22d, 25th; Lake Region, 3d, 9th, 10th, 12th, 15th, 16th, 19th.

Hail fell on the 10th, 12th, 15th, 16th, 17th, 19th.

Auroras were noted at Jamestown on the 13th and 30th.

Light frosts were reported from a few stations of Allegany and Cattaraugus counties on the 21st, from Waverly on the 26th, and from North Hammond on the 23d.

GENERAL FEATURES OF THE WEATHER.

This month was cooler than usual, especially in the northern part of the State. The temperature was equable, moderate deficiencies being maintained during more than half the month, while the brief warm waves of the first and middle portions of the month were severe only in portions of the western section. Fair, pleasant weather prevailed in the central and western counties, while in the northern highlands the number of cloudy and rainy days was excessive. The total rainfall for the State was deficient, a drouth and low ground water being locally reported from counties in the southwest and near Lake Ontario.

The month was fairly favorable for agricultural interests, although damp weather in the North and East was unfavorable

for harvesting, while drouth in some western localities injured growing crops. Severe local storms occurred, but less frequently than in July.

Eight areas, each, of high and low pressure, affected the weather in this vicinity during August. The atmospheric movements were more rapid than in preceding summer months, but the pressure waves were of small range and intensity over the Eastern States, and there was a corresponding stability in the temperature conditions. The general storm track lay near or beyond our northern border, and only one coast storm, which was of small intensity, appeared. The following is a brief account of the atmospheric movements:

Low I, 29.9 inches, over the New England coast on 1st, showers in eastern New York. Continued as a general depression over the Provinces and coast during the following week.

High I, 30.1 inches, a ridge from Mexican gulf to lakes on the 1st, and on three following days passing over Eastern to Gulf States, generally fair hot weather prevailing in western and southern New York after the 1st.

High II, 30.4 inches, reached the Upper Lakes, from the West, on the 4th afterward covering the Eastern and Central Coast States until the 9th, and giving seasonable pleasant weather.

Low II, 29.7 inches, originated in the Northwest, reached the Lake Region on the 10th, passing slowly down the St. Lawrence Valley on the 11th and 12th, giving general rains, the fall being large in some localities, especially in the counties east of Lake Ontario. A clearing condition,

High III, 30.1 inches, appeared on the northeast coast on the 10th and 11th. The temperature fell slightly below normal with the advance of

High IV, 30.1 inches, on the 12th extending from the lakes to the Mexican gulf, and thence passing over the Coast States to the Southeast on the 13th and 14th, with fair weather.

Low III, 29.6 inches, passed from the Lake Region over Canada on the 15th and 16th, giving general thunder showers. This low brought the second and final hot wave of the month.

High V, 30.2 inches was formed by an area originating in the West, reaching the Central States on the 17th; and by a second area from British Columbia, uniting with the former, and covering the Eastern-Central States on the 19th to 24th. The accompanying fair weather was interrupted by

Low IV, 29.8 inches, passing slowly over Canada on the 18th to 20th, and on the 19th giving general thundershowers.

High VI, 30.1 inches, developed north of the lakes, covering Canada and northeastern New York on the 23d, when a considerable fall of temperature occurred. At the same time,

Low V, 29.8 inches, passed to the central coast, giving rain in southeastern New York; while

Low VI, 29.7 inches, passed eastward along the Canadian border; and on the 24th and 25th, uniting with V, was general over northern New York and Canada, the heaviest rains of the month falling in eastern New York.

High VII, 30.1 inches was over the Gulf States on the 25th, thence spreading northeastward and giving generally fair weather in this section until the 30th. The temperature meanwhile rose slowly to the normal value while

Lows VII and VIII, 29.8 and 29.7 inches respectively, passed eastward well to the north of our borders on the 27th and 29th, the latter giving light showers, except in the Southeast:

High VIII, 30.1 inches, passing along the Canadian border, reached the lakes and New York on the 31st bringing fair weather.

NOTES FROM THE CROP BULLETIN: Bright drying weather during the first week was favorable both for harvesting and for the growth of crops, after the excessive rains of July. Wheat, rye and barley were generally secured in fair condition excepting in the north. Corn, late potatoes, vegetables and tree fruits (excepting apples) developed finely, and buckwheat came into bloom. Two weeks of showery weather followed, with deficient temperatures after the 16th, and these conditions were rather unfavorable for growth and harvesting, although many localities in the central and western counties escaped the showers and reported a drouth. A fine second crop of clover was gathered during this time. The remainder of the month was cool; but with less rainy and cloudy weather, late harvesting made a fair progress in the north. The oats harvest was well under way by the third week, and some fodder corn was cut before the close of the month; but generally the season was reported as from one to three weeks later than usual. Buckwheat continued in good condition, and other grains yielded well in threshing. The apple crop was generally poor, but other tree fruits were exceptionally abundant. Tobacco cutting was under way at the end of August, giving an exceptionally good yield. Early potatoes blighted badly, and the outlook for the entire crop was unfavorable.

NOTES OF OBSERVERS AT THE FOLLOWING STATIONS: South Canisteo; the month ends very dry, water low in streams and wells. Lake Placid, a cold rainy month. North Hammond, unusually cold month. Penn Yan, rain needed badly.

LOCAL STORMS, ETC.: Jamestown, heavy thunder and wind storm on the 30th; Cedar Hill, high wind, rain and hail on the 15th.

On the 23d a destructive tornado occurred about 10 miles north of Amsterdam. A house, its outbuildings and barns were entirely demolished, and on an adjacent farm the barns were also swept away. The path traversed was narrow, but within its range no trees or buildings were left standing. No loss of life was reported. It is remarkable that in August, 1896, a similar destructive tornado occurred very near the scene of this storm.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
<i>Western Plateau.</i>														
Alfred.....	Allegany.....	1795.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.5	99	3
Angelica.....	".....	1340.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.6	85	3
Bolivar.....	".....	1800.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.2	85	b
Franklinville.....	Cattaraugus.....	1598.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.6	86	b
Humphrey.....	".....	1950.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkwright.....	Chautauqua.....	1260.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.2	79	14
Jamestown.....	".....	1324.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.1	84	b
Elmira.....	Chemung.....	863.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.6	89	4
Avon.....	Livingston.....	585.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.7	90	3
Mt. Morris.....	".....	525.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68.3	99	3
Lockport.....	Niagara.....	650.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.5	65.8	86
Wedgewood.....	Schuyler.....	1350.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.4	67.6	88
Addison.....	Steuben.....	1000.....	.....	.....	.....	.....	.....	.....	72	55	63.8	64.6	87	4
South Canisteo.....	".....	1480.....	.....	.....	.....	.....	.....	.....	77	55	61.4	62.4	88	3
Arcade.....	Wyoming.....	1707.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.6	62.6	84
<i>Eastern Plateau.</i>														
Binghamton (1).....	Broome.....	870.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.0	92	4
Binghamton (2).....	".....	875.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.6	66.0	88
Oxford.....	Chenango.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.0	86	4
Cortland.....	Cortland.....	1120.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.8	92	4
South Kortright.....	Delaware.....	1706.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.4	87	c
Buckville.....	Madison.....	1250.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.8	85	3
Middletown.....	Orange.....	700.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.4	67.5	86
Port Jervis.....	".....	470.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.4	85	15
Cooperstown.....	Otsego.....	1250.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.3	63.8	82
Garattsville.....	Otsego.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.8	63.2	83
New Lisbon.....	".....	1234.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60.4	62.2	85
Oneonta.....	".....	1100.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.2	66.0	90
Perry City.....	Schuyler.....	1038.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.8	63.8	87
Straits Corners.....	Tioga.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.4	89	b
Waverly.....	".....	824.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.8	66.0	89
Dryden.....	Tompkins.....	1079.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.8	87	g
Mohonk Lake.....	Ulster.....	1245.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.5	67.2	80
<i>Northern Plateau.</i>														
Elizabethtown.....	Essex.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.9	87	15
Lake Placid.....	".....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.0	78	3
Saranac Lake.....	Franklin.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.0	83	15
Gloversville.....	Fulton.....	850.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.6	64.2	87
Little Falls (2a).....	Herkimer.....	1536.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.4	85	16
North Lake.....	".....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.2	80	h
Lowville.....	Lewis.....	900.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.8	83	i
Number Four.....	".....	1571.....	29.99	30.18	5	29.65	11	0.53	87	56	.....	60.2	80	3
<i>Atlantic Coast.</i>														
Brooklyn.....	Kings.....	70.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.9	86	16
Manhattan Beach.....	".....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New York City.....	New York.....	314.....	29.99	30.30	7	29.66	11	0.54	76	66	.....	71.0	84	4
Will-ts Point.....	Queens.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.7	85	j
Brentwood.....	Suffolk.....	80.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68.4	92	22

FOR AUGUST, 1897.

TEMPERATURE — (IN DEGREES FAHR.)										SKY.			PRECIPITATION — (INCHES.)						Prevailing direction of wind.
Lowest.	Date.	Monthly range.		Mean daily range.		(Greatest daily range.		Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.
34	21	46	23	42	21	5	11	14.5	13.2	3.3	9.3	2.42	1.14	h. m.	24	.....	.....	.....	.....
38	21	47	25	39	ac	13	25	6	18	7	10	1.77	0.60	.....	16	.....	.....	.....	.....
36	21	49	25	38	ad	14	ce	9	19	3	9	3.26	0.68	.....	10	.....	.....	.....	W.
38	21	48	25	37	27	10	17	19	3	9	14	2.63	0.90	2.50	10	.....	.....	.....	W.
49	26	30	12	18	14	5	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
43	21	41	21	30	21	11	25	5	25	1	11	2.95	0.90	.....	16	.....	.....	.....	S. W.
43	21	46	23	35	ac	12	29	24	0	7	7	3.70	1.14	.....	24	.....	.....	.....	N. W.
42	r	48	24	23	27	13	19	14	16	1	5	0.90	0.43	.....	19	.....	.....	.....	.....
40	31	59	27	40	31	16	23	18	13	0	1	0.30	0.20	.....	19	.....	.....	.....	W.
45	24	41	21	32	24	9	19	18	13	0	9	2.29	0.70	.....	16	.....	.....	.....	W.
46	21	42	25	37	21	12	10	4	27	0	14	3.04	0.60	0.25	3	.....	.....	.....	S. W.
41	21	46	21	36	21	14	cf	26	3	2	11	2.05	0.60	4.45	10	.....	.....	.....	W.
34	21	54	28	42	21	16	16	19	10	2	10	2.69	0.47	.....	10	.....	.....	.....	W.
41	21	43	22	31	7	13	15	12	11	8	11	3.62	1.04	.....	10	.....	.....	.....	.....
38	s	44	23	41	2	6	24	15.5	11.2	4.3	9.2	3.20	2.75	7.20	11	.....	.....	.....	.....
43	21	45	24	25	ac	12	24	14	14	3	6	1.84	0.81	.....	24	.....	.....	.....	S. W.
42	21	44	22	35	21	9	23	11	14	6	9	1.37	0.70	.....	5	.....	.....	.....	N. W.
38	21	54	29	39	ai	15	24	6	24	1	9	2.68	1.80	.....	24	.....	.....	.....	W.
41	21	44	24	36	14	12	24	25	6	0	9	2.07	0.50	.....	19	.....	.....	.....	N. W.
38	5	49	28	41	2	14	30	.....	.....	.....	8	6.03	2.75	7.20	11	.....	.....	.....	.....
43	41	42	20	30	14	6	24	13	8	10	10	1.93	0.37	3.00	24	.....	.....	.....	N. W.
50	t	36	20	33	14	8	10	15	14	2	8	3.85	1.76	.....	24	.....	.....	.....	.....
46	21	39	19	32	2	10	5	27	3	1	11	3.65	1.66	.....	24	.....	.....	.....	S. W.
44	21	38	18	29	27	7	17	13	14	4	9	6.60	2.15	.....	15	.....	.....	.....	S.
40	21	43	20	32	21	11	24	20	3	8	6	4.31	1.15	13.00	24	.....	.....	.....	W.
39	u	46	25	36	ac	10	24	13	9	9	9	3.17	1.08	1.30	10	.....	.....	.....	S.
40	21	50	27	39	21	18	cg	.....	.....	.....	9	2.43	0.43	.....	4	.....	.....	.....	.....
40	21	47	26	37	ad	13	24	10	16	5	12	2.30	0.55	.....	24	.....	.....	.....	N. W.
42	31	47	26	35	29	16	10	25	2	4	8	2.66	1.14	.....	23-24	.....	.....	.....	N.
43	v	46	27	37	ag	11	23	10	18	3	13	3.21	1.33	20.00	23-24	.....	.....	.....	N. W.
42	w	45	24	35	14	13	24	.....	.....	.....	16	2.22	0.65	.....	19-20	.....	.....	.....	.....
52	23	28	12	30	8	7	dd	.....	.....	.....	5	4.11	1.89	17.30	23-24	.....	.....	.....	N. W.
38	x	42	21	37	14	5	de	10.5	14.6	5.0	11.7	3.42	2.84	19.30	10-11	.....	.....	.....	.....
40	20	38	18	28	29	10	1	.....	.....	.....	11	1.23	0.31	.....	10	.....	.....	.....	W.
38	22	45	23	35	22	5	24	8	22	1	13	2.56	0.40	.....	10-16	.....	.....	.....	W.
38	21	47	23	37	14	10	24	12	14	5	17	3.46	1.27	.....	24	.....	.....	.....	W.
38	21	47	22	31	Lb	5	25	15	10	6	12	3.44	1.10	.....	17	.....	.....	.....	W.
40	21	49	19	27	28	5	25	15	6	10	9	4.97	2.26	.....	10	.....	.....	.....	N. E.
43	31	40	22	35	29	10	17	8	21	2	11	3.27	1.82	.....	10-11	.....	.....	.....	W.
40	31	40	20	31	bc	10	17	5	15	11	9	4.97	2.84	19.30	10-11	.....	.....	.....	W.
45	21	34	18	33	6	5	df	14.8	9.0	7.2	9.6	3.53	2.12	3.05	16	.....	.....	.....	.....
56	31	30	16	24	4	5	9	14	6	11	11	4.07	1.30	19.30	24	.....	.....	.....	W.
60	20	24	12	18	29	6	10	15	7	9	13	3.14	1.10	.....	24	.....	.....	.....	S.
55	26	30	18	25	td	14	dg	.....	.....	.....	10	2.26	0.65	.....	15	.....	.....	.....	N. E.
45	21	47	24	33	6	10	23	23	1	7	5	2.10	0.90	.....	15	.....	.....	.....	N. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
<i>Atl. Coast (Con)</i>														
Setauket	Suffolk	40	.....	.....	.....	.....	.....	.....	78	63	69.6	70.0	83	8
Bedford	Westchester ..	290	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.5	83	15
Primrose	"	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.2	88	15
<i>Hudson Valley</i>														
Albany	Albany	97	29.99	30.24	7	29.64	11	0.60	82	62	.....	68.6	89	4
Cedar Hill .....	" .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.0	89	4
Honeynead Brook ..	Dutchess	450	.....	.....	.....	.....	.....	.....	.....	.....	66.1	66.4	85	15
Poughkeepsie	"	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.3	87	4
Wappinger's Falls ..	Dutchess	110	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Catskill	Greene	450	.....	.....	.....	.....	.....	.....	.....	.....	.....	68.8	86	4
West Point	Orange	167	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.2	86	1
Carmel	Washington ..	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.9	86	6
Greenwich	Putnam .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67.9	87	.....
<i>Mohawk Valley</i>														
Little Falls (1a)	Herkimer	924	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.9	88	g
Canajoharie	Montgomery ..	340	.....	.....	.....	.....	.....	.....	.....	.....	68.6	68.8	87	g
St. Johnsville	"	840	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.8	85	15
Rome	Oneida	445	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.6	88	15
<i>Champlain Valley</i> ..														
Plattsburgh Barracks.	Clinton	125	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.7	86	15
Ticonderoga	Essex .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.2	82	m
Glens Falls	Warren	340	.....	.....	.....	.....	.....	.....	.....	.....	64.8	66.8	86	15
Lake George	"	350	.....	.....	.....	.....	.....	.....	80	60	64.7	65.5	85	15
<i>St. Lawrence Val.</i> ..														
Madison Barracks ..	Jefferson	266	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.9	88	3
Watertown	"	486	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.5	87	4
Canton	St. Lawrence ..	304	.....	.....	.....	.....	.....	.....	.....	.....	63.9	64.8	87	3
North Hammond ..	St. Lawrence ..	300	.....	.....	.....	.....	.....	.....	.....	.....	65.2	65.8	88	3
Ogdenburg	"	258	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.8	82	n
Potsdam	"	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	64.7	86	14
<i>Great Lakes</i>														
Westfield	Chautauqua ..	778	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.6	88	3
Buffalo	Erie	768	29.97	30.26	6	29.66	16	0.60	69	56	.....	65.8	84	p
Pittsford	Monroe	592	.....	.....	.....	.....	.....	.....	.....	.....	65.2	67.0	85	3
Rochester	Monroe	523	29.97	30.23	6	29.66	11	0.57	72	56	.....	67.0	88	3
Appleton	Niagara	61	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.1	85	14
Fort Niagara	"	263	.....	.....	.....	.....	.....	.....	.....	.....	.....	68.0	88	7
Baldwinsville	Onondaga	390	.....	.....	.....	.....	.....	.....	.....	.....	66.2	67.6	86	14
Ridgeway	Orleans .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.1	82	p
Oswego	Oswego	335	29.95	30.20	6	29.62	11	0.58	.....	.....	.....	66.0	81	3
Palermo	"	460	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lyons	Wayne	407	.....	.....	.....	.....	.....	.....	.....	.....	67.2	67.0	87	3
Erie, Pa.	Erie	714	30.00	30.27	6	29.72	a	0.55	76	59	.....	67.0	84	14

FOR AUGUST, 1897 — (Continued).

TEMPERATURE — (IN DEGREES FAHR.).							SKY			PRECIPITATION — (INCHES).							Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.	
53	21	36	14	23	21	5	23	16	9	6	7	5.03	2.12	h. m.	16	S. W.	
46	21	37	19	29	21	8	24	14	11	6	10	4.26	1.69	15.40	21-22		
48	21	40	22	32	14	11	ee	7	20	4	11	3.83	1.10	.....	16	
43	21	39	20	28	27	3	9	12.8	11.2	7.0	9.3	4.42	1.80	12.00	22	S. W.	
50	23	39	20	27	21	8	24	13	14	4	9	4.43	1.71	.....	24	
.....	.....	.....	.....	.....	.....	.....	.....	15	7	9	14	5.14	1.35	.....	24	S.
46	21	39	20	28	21	9	24	9	12	10	12	4.42	1.40	.....	23	S. W.
43	21	44	23	35	21	15	ef	18	10	3	6	2.81	1.80	12.00	22	S.	
.....	
50	21	36	17	25	21	5	24	3	22	6	10	4.13	1.08	3.00	15	S.	
50	21	36	17	28	be	3	9	.....	.....	.....	6	5.15	1.60	.....	24	S.
47	21	39	22	33	27	13	5	19	2	10	8	4.90	1.64	2.00	11	.....
.....	
41	25	42	20	34	25	5	24	20.3	4.0	6.7	8.8	2.85	1.35	.....	*16	W.
45	29	41	20	28	bf	5	24	24	2	5	8	2.52	0.75	.....	10	
49	31	39	17	27	14	5	21	20	0	11	9	2.98	1.01	.....	24	W.
42	21	43	19	32	21	5	24	17	10	4	10	3.28	0.95	.....	24	W.
41	25	47	22	34	25	8	5	.....	.....	.....	8	2.71	1.35	.....	16	.....
.....	
42	21	40	21	23	bg	4	24	11.0	11.5	8.5	12.5	4.43	1.55	22.00	11	S. W.	
44	23	38	19	33	23	10	10	25	.....	.....	12	3.93	0.60	.....	12	
45	23	41	19	27	27	6	24	13	9	9	12	3.34	1.55	22.00	11	N.	
42	21	43	22	33	6	5	21	.....	.....	.....	11	5.42	1.46	.....	15-16	N.
45	21	37	21	29	7	4	24	9	14	8	15	5.02	1.10	.....	24	S.
.....	
35	23	47	23	48	23	8	22	10.0	12.2	8.8	8.0	2.16	1.10	.....	10	S. E.
35	23	52	29	48	23	13	1	.....	.....	.....	8	1.90	1.10	.....	10	
.....	
41	y	46	23	33	27	13	4	14	8	9	7	3.33	1.07	.....	11	S. W.
.....	
44	y	41	18	30	3	10	19	11	9	11	9	2.19	0.86	.....	11	S.
38	13	44	20	36	13	8	22	7	18	6	10	1.40	0.45	.....	11	S. W.
38	22	48	23	22	22	11	5	8	14	9	6	1.93	1.00	.....	11-12	S. W.
.....	
46	21	36	18	23	27	6	19	13.8	12.3	4.9	8.4	2.25	1.11	.....	16	S. W.
47	18	37	19	28	13	9	17	9	3	9	8	3.64	1.08	.....	10	
53	21	32	14	19	cc	7	19	11	14	6	8	2.12	0.78	.....	16	W.
48	te	39	20	33	27	8	20	11	13	7	8	1.13	0.50	.....	10	N. W.
.....	
49	21	39	20	28	7	6	19	12	15	4	9	1.72	0.91	.....	10	S. W.
46	21	39	19	30	14	9	23	12	12	7	7	2.14	0.96	.....	16	S. W.
50	26	38	19	27	te	7	17	.....	.....	.....	7	1.94	0.60	5.00	16	S. W.
50	7	36	21	32	27	14	11	22	4	5	7	2.63	0.92	.....	16	.....
.....	
50	aa	32	17	24	27	7	19	12	19	0	10	1.83	0.49	9.30	16	S. W.	
50	21	31	14	28	27	8	21	13	12	6	11	1.70	0.53	.....	10	S.
.....	
48	21	39	18	29	27	11	eg	13	17	1	8	1.22	0.31	.....	29	N. W.
50	21	34	15	22	14	7	17	13	14	4	9	4.70	1.11	.....	16	S.

METEOROLOGICAL DATA.

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations	Mean of maximum and minimum.	Highest.	Date.
Central Lakes												66.9	89	3
Fleming.....	Cayuga.....	1000									66.9	67.0	86	3
Watkins.....	Schuyler.....								75	61		67.0	89	3
Romulus.....	Seneca.....	719							81	56		67.8	89	3
Ithaca.....	Tompkins ..	810	29.96	30.33	6	29.62	11	0.61	72	56	64.8	65.8	83	9
Penn Yan.....	Yates.....								78	61		67.1	88	3
Mean.....			29.98	30.27	6	29.62	11	0.57	76	59		66.0	90	3

* Mean of the tri-daily observations. † Mean of the Maximum and Minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) twenty four hours. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City Reservoir.

(a) 10, 16; (b) 3, 4; (c) 4, 22; (d) 2, 4; (e) 3, 4, 15; (f) 4, 15; (g) 3, 15; (h) 4, 5, 16; (i) 3, 9; (j) 2; (k) 18, 21, 31; (l) 21, 26; (m) 21, 31; (n) 21, 22; (o) 23, 31; (p) 24, 26; (q) 21, 23; (r) 7, 27; (s) 21, 25; (t) 6, 23; (u) 2, 29; (v) 21, 29; (w) 5, 17, 23; (x) 23, 24; (y) 12, 17, 24; (z) 24, 28; (aa) 5, 24, 25

FOR AUGUST, 1897 — (*Concluded.*)

TURE — (IN DEGREES FAHR.).								SKY.		PRECIPITATION — (INCHES).						Prevailing direction of wind.	
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.		Total snowfall.
43	21	39	20	38	21	10	<i>ff</i>	10.2	15.2	5.6	8.8	1.74	0.73	<i>h m</i> 4.00	11	.....	.....
50	<i>ab</i>	36	17	27	29	10	<i>ff</i>	3	25	3	5	2.52	0.73	4.00	11	.....	N. W.
42	21	46	23	38	21	11		5	16	6	14	1.87	0.37	.....	23-24	.....	N. W.
49	21	40	21	34	29	11	<i>fg</i>	21	5	5	5	0.78	0.31	.....	24	.....	W.
46	<i>w</i>	37	20	31	<i>cd</i>	11	10	12	15	4	13	2.74	0.65	13.00	24	.....	W.
48	21	40	20	32	27	12	15	6	15	10	7	1.28	0.73	13.30	24	.....	S. W.
34	21	41	21	48	23	3	9	13.3	11.5	6.2	9.6	3.04	2.84	19.30	10-11	.....	W.

Thermograph. † Report received too late to be used in computing means. The means from 4. † Blank indicates that the duration is not shown in the original records, but is within (2a) Intake Conduit, nine miles north of city.

30; (k) 4, 15, 27; (m) 4, 8, 16; (n) 2, 9; (p) 3, 14; (q) 3, 14, 15; (r) 20, 23; (s) 5, 21; (t) 17, 27, 28; 27; (ae) 14, 21; (af) 14, 24, 27; (ag) 7, 27, 29; (bb) 6, 22; (bc) 6, 8; (bd) 26, 30; (be) 6, 7; (bf) 4, 29; (df) 9, 23; (dg) 4, 5, 9, 10, 19, 24; (ee) 5, 24; (ef) 5, 17; (eg) 4, 17; (ff) 5, 15, 25; (fg) 15, 25.

TEMPERATURE—AUGUST, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	66	68	72	72	67	64	66	67	67	68	65	64	62	66
Angelica	75	80	85	84	80	75	83	78	81	76	78	74	75	82
Bolivar	50	52	53	56	60	43	44	51	48	56	54	48	44	45
Franklinville	77	81	85	85	70	75	78	76	78	70	72	73	75	80
Humphrey	47	50	52	55	56	43	42	50	46	54	54	51	43	45
.....	76	81	86	86	73	78	80	78	80	77	71	71	74	80
.....	58	50	54	55	60	43	45	53	47	55	53	49	43	46
<i>Arkwright</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jamestown	76	82	84	81	72	75	78	77	78	73	72	70	75	81
Elmira	52	53	60	61	59	50	52	59	53	60	58	55	47	54
.....	75	83	88	89	77	82	81	84	85	76	73	79	82	85
Avon	62	55	57	65	61	52	51	60	56	58	60	56	53	50
.....	82	80	90	76	74	80	79	81	81	84	76	81	76	84
Mount Morris	57	58	54	60	58	49	53	55	56	60	58	50	47	56
.....	80	83	99	89	90	85	88	88	85	87	80	80	80	81
.....	60	55	60	62	65	58	54	51	55	65	60	55	55	55
Lockport	78	82	85	80	72	80	86	84	84	84	77	74	77	85
.....	62	64	62	64	62	58	57	59	57	63	58	55	50	56
Wedgewood	78	87	88	87	74	86	87	79	87	72	76	77	82	84
.....	58	55	61	63	59	52	55	59	58	60	57	56	49	56
Addison	76	81	86	87	73	78	79	78	81	76	74	77	77	83
.....	54	55	57	67	57	48	48	52	55	57	54	52	50	48
South Canisteo	76	80	88	86	74	77	79	76	81	74	72	74	75	82
.....	48	47	51	55	52	43	54	51	50	54	50	48	42	46
Arcade	73	79	84	84	69	75	80	77	80	75	71	70	71	79
.....	51	51	59	58	53	47	49	58	51	57	56	52	47	54
<i>Eastern Plateau...</i>	63	68	71	71	65	65	66	67	69	67	68	65	63	66
Bioghamton (1)	77	84	87	88	75	79	81	80	80	78	76	77	75	85
.....	53	55	56	68	61	52	50	55	60	60	60	54	50	50
Binghamton (2)	74	81	85	86	74	77	83	78	82	76	76	76	76	83
.....	60	57	55	68	60	54	50	56	62	62	62	57	52	52
Oxford	80	82	88	92	77	82	85	81	84	78	81	82	76	84
.....	54	55	54	63	55	48	46	51	55	57	57	51	46	45
Cortland	76	80	85	84	71	79	81	78	80	73	76	76	82	83
.....	60	54	56	65	60	49	48	54	60	56	54	49	47	47
South Kortright	77	82	79	87	74	79	85	81	77	78	76	72	73	82
.....	56	41	49	50	38	46	45	56	54	50	55	50	48	45
Bouckville	73	76	85	83	74	77	78	78	79	74	74	74	72	80
.....	58	54	57	62	57	53	50	56	59	60	58	52	50	50
Middletown	85	86	85	86	76	80	81	81	78	69	79	74	73	84
.....	61	59	64	63	61	55	57	60	69	61	63	60	55	51
Port Jervis	78	80	83	82	72	78	82	80	77	75	78	76	76	82
.....	69	58	60	63	62	56	54	56	62	60	64	60	55	58
Cooperstown	72	76	82	82	70	74	77	78	76	74	73	65	69	78
.....	60	61	57	65	56	51	52	56	60	58	60	57	53	56
Garrattsville	73	78	82	3	72	77	78	77	76	72	74	71	70	80
.....	59	57	55	66	53	58	50	53	58	59	58	56	50	52
New Lisbon	74	80	83	85	73	77	81	79	79	74	74	71	72	80
.....	58	54	53	62	55	45	45	50	56	54	58	52	49	45
Oneonta	82	85	88	90	79	83	85	82	84	77	79	72	79	85
.....	59	57	55	66	57	50	49	53	56	55	59	54	50	51
Perry City	75	81	87	83	73	78	82	80	84	76	73	76	77	84
.....	58	50	54	64	57	46	47	52	56	59	59	52	47	48
Straits Corners	79	83	89	89	76	79	86	89	83	74	81	80	77	85
.....	59	60	61	61	59	55	54	52	57	53	57	53	50	54
Waverly	77	81	88	89	80	85	85	80	83	84	76	78	80	80
.....	56	57	55	56	64	50	48	55	57	57	54	50	58	47
Dryden	73	82	87	83	.....	77	83	81	82	76	77	75	75	83
.....	59	51	59	63	.....	47	49	55	60	62	56	50	47	48
Mohonk Lake	72	78	79	80	71	74	76	76	74	71	76	76	72	79
.....	64	63	65	66	57	58	62	66	64	61	63	61	57	63

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
70	67	62	62	62	57	59	63	62	65	64	59	63	62	66	64	59	64.5
78	73	68	71	73	65	74	75	66	74	70	69	89	73	81	74	72	62.6
60	58	52	50	51	44	38	47	53	56	57	43	41	44	46	55	41	61.2
75	71	67	70	73	67	74	75	67	74	70	70	78	73	80	70	71	62.6
57	56	53	48	46	40	36	46	53	55	53	41	40	45	44	50	39	62.6
77	71	67	69	72	66	74	75	71	74	70	71	79	72	81	74	73	62.6
60	58	57	51	50	42	38	45	55	59	58	42	42	45	46	54	42	62.6
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	63.2
77	79	67	71	71	65	73	72	73	74	68	71	79	73	80	72	72	64.1
62	58	55	52	56	47	43	50	55	57	57	45	53	54	52	54	46	67.6
81	82	75	76	78	71	78	80	78	75	78	79	75	79	78	79	73	65.7
67	61	55	54	54	56	43	57	55	57	59	48	51	59	66	54	47	68.3
82	73	74	77	68	76	78	77	68	75	72	73	85	72	85	77	75	65.7
63	59	58	52	55	42	50	42	50	52	53	46	46	51	52	56	53	68.3
82	80	81	80	75	70	80	80	76	81	70	75	75	84	80	80	80	65.8
62	62	60	55	55	45	55	55	60	50	45	45	55	52	45	50	40	67.6
82	74	71	75	65	69	72	76	69	77	69	70	80	72	82	68	74	64.6
64	56	49	48	56	49	47	54	52	45	57	50	53	53	56	50	50	62.4
84	78	75	76	76	74	83	83	73	80	78	79	81	79	84	79	81	62.6
65	59	52	51	53	49	46	55	49	57	65	48	51	56	52	54	48	65.0
79	78	71	74	76	69	77	78	67	73	76	72	79	75	81	73	74	66.0
60	60	52	49	47	49	41	51	53	59	60	47	46	50	48	57	43	64.8
76	74	69	72	77	67	76	78	78	73	74	72	81	74	82	72	73	62.4
59	54	49	45	47	45	34	48	50	51	55	42	41	44	43	49	38	62.6
76	72	67	71	70	63	71	72	69	72	68	68	78	69	78	71	70	65.0
63	58	51	51	54	46	41	49	53	50	54	44	49	50	53	53	41	66.0
72	71	62	60	63	61	59	67	61	63	65	60	62	64	64	63	59	66.0
86	82	70	75	78	68	78	79	76	70	76	70	80	75	82	72	73	66.0
60	62	52	45	49	54	43	54	56	58	57	49	46	55	47	55	45	66.0
86	82	69	74	77	69	77	80	65	70	76	70	79	75	82	71	73	64.8
66	64	56	50	52	51	42	55	56	59	58	43	45	56	48	54	47	64.2
91	85	73	75	80	72	77	81	70	70	74	73	80	75	81	74	75	62.4
55	55	52	42	44	51	38	49	49	55	51	47	41	48	44	57	40	63.8
81	79	69	72	75	69	69	77	69	71	74	71	78	75	80	79	73	62.4
46	59	55	44	50	49	41	55	53	59	55	45	45	52	45	57	43	62.4
81	81	70	72	76	69	74	87	69	73	75	73	76	73	80	70	70	63.8
55	62	51	40	42	51	39	56	45	55	50	44	40	50	45	56	39	67.5
84	78	67	71	73	64	73	72	68	64	73	68	75	70	77	70	69	67.4
62	60	54	48	52	57	46	54	49	58	54	48	49	53	48	53	43	63.8
81	80	69	70	75	77	71	79	79	70	76	74	77	79	77	75	74	62.2
65	59	59	55	50	60	58	64	58	58	60	58	59	50	51	52	50	66.0
85	81	73	75	76	73	77	78	68	71	76	74	76	76	77	75	73	63.8
65	64	58	52	56	58	46	60	55	59	60	57	49	62	52	58	51	63.2
82	78	65	69	76	63	71	76	65	64	71	67	74	70	76	68	64	62.2
63	62	58	48	50	51	44	56	55	44	55	52	45	56	56	46	50	66.0
83	73	67	69	73	64	72	75	69	65	70	67	74	75	76	66	70	63.2
60	61	51	45	50	52	40	54	51	54	50	45	44	53	48	49	44	62.2
84	78	68	70	75	65	74	77	68	67	72	69	76	74	79	70	72	66.0
55	58	51	39	42	47	39	49	45	57	49	44	40	48	46	51	39	63.8
87	86	72	74	79	71	79	81	70	74	78	76	80	76	84	75	76	62.2
57	61	54	44	46	50	40	55	49	56	55	48	44	52	48	52	43	67.2
80	80	69	74	77	67	77	77	70	71	75	69	81	73	80	71	74	66.4
62	59	50	45	48	46	40	52	47	58	58	46	44	48	45	50	41	66.0
84	89	72	73	80	74	76	84	74	78	74	75	77	75	80	70	77	62.2
59	60	52	48	50	52	44	58	55	55	55	43	43	49	45	51	42	66.0
86	80	74	75	78	74	78	85	68	74	77	74	81	81	84	78	78	64.8
62	60	53	46	48	55	43	54	57	60	55	43	44	53	47	60	54	67.2
87	81	69	74	77	66	77	77	70	70	74	70	79	81	81	71	73	64.8
64	60	51	46	55	47	42	51	53	57	51	44	49	56	56	49	42	67.2
79	77	68	70	74	69	72	76	68	65	73	71	73	71	73	74	71	67.2
66	64	69	58	62	58	59	64	52	58	60	58	59	64	61	62	56	67.2

TEMPERATURE—AUGUST, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau..</i>	66	66	68	68	62	62	64	66	65	64	65	61	59	65
Lake Placid.....	71	74	78	69	68	72	76	76	74	74	70	65	63	72
Saranac Lake.....	61	57	56	59	59	48	50	55	52	52	52	52	51	59
Gloversville.....	74	80	82	75	75	77	82	82	81	77	75	70	70	82
Little Falls (2a)....	59	55	60	48	45	48	52	50	49	57	55	50	53	59
North Lake.....	79	79	84	85	75	80	80	80	78	73	78	74	72	82
Lowville.....	60	55	56	61	56	49	50	55	58	54	63	56	48	55
Number Four.....	76	77	83	84	.....	79	81	79	78	72	74	71	71	70
Atlantic Coast.....	56	54	59	58	49	48	53	58	51	60	56	50	54	50
Brooklyn.....	72	73	79	80	80	71	75	79	77	77	70	70	68	61
New York City.....	59	55	55	63	56	47	50	55	53	55	60	50	46	50
Willels Point.....	75	80	83	79	74	79	81	81	83	70	72	72	70	81
Brentwood.....	60	61	51	59	54	46	47	51	49	50	58	53	47	60
Setanket.....	69	77	80	78	73	75	75	78	74	75	67	69	67	72
Bedford.....	50	52	52	53	53	44	47	47	52	49	56	50	44	52
Hudson Valley.....	71	73	73	74	67	70	71	70	69	71	73	71	68	71
Albany.....	82	85	81	85	72	81	83	82	72	79	83	81	80	85
Honeymead Brook..	66	66	67	61	67	61	62	65	67	66	66	65	62	64
Poughkeepsie.....	78	82	80	84	70	79	80	77	73	73	80	79	75	79
Wappinger's Falls..	66	66	70	68	63	61	66	67	66	67	67	65	62	64
Catskill.....	79	85	84	81	71	79	84	82	77	78	80	83	80	83
West Point.....	63	64	67	67	57	60	60	63	63	64	65	61	60	64
Setanket.....	84	85	80	79	75	87	85	83	80	81	79	81	78	80
Bedford.....	69	62	55	55	55	54	53	52	53	57	64	53	53	57
Primrose.....	78	78	83	81	74	79	79	75	78	79	78	79	76	81
Hudson Valley.....	65	64	64	68	60	58	60	59	61	63	66	67	62	60
Albany.....	77	82	82	82	74	79	81	78	77	77	82	79	75	81
Honeymead Brook..	59	60	60	66	60	56	55	56	60	59	65	61	53	55
Poughkeepsie.....	80	84	86	86	72	80	85	84	80	80	83	84	82	86
Wappinger's Falls..	58	58	59	66	61	58	62	55	64	68	65	58	55	54
Catskill.....	71	72	74	76	68	70	70	70	63	69	72	69	67	70
West Point.....	80	83	88	89	78	84	85	85	81	77	80	77	79	84
Carmel.....	66	63	64	65	62	58	58	64	65	63	65	61	60	61
Little Falls (1a)....	76	78	84	84	72	76	78	81	78	80	80	78	72	79
St. Johnsville.....	58	60	58	59	59	58	58	57	59	58	61	60	57	58
Rome.....	77	82	86	87	75	80	81	82	79	78	82	80	71	83
Champlain Valley..	58	58	57	65	60	61	53	56	59	59	63	53	51	53
Plattsburgh Bar'ks	77	81	85	86	73	80	80	82	77	76	78	78	76	82
Ticonderoga.....	67	67	63	68	61	62	57	61	62	60	64	61	62	58
Glens Falls.....	89	80	85	83	80	85	84	80	61	80	79	82	80	80
Lake George.....	78	68	67	73	60	57	56	56	53	62	69	65	66	65
Champlain Valley..	70	80	85	86	72	79	84	82	81	77	83	80	75	83
Plattsburgh Bar'ks	58	64	62	64	59	57	60	59	58	55	60	58	53	60
Ticonderoga.....	69	69	74	75	66	67	68	71	71	68	67	65	65	71
Glens Falls.....	76	78	86	86	82	78	78	81	80	79	72	74	76	83
Lake George.....	59	60	69	58	56	52	52	61	57	60	53	57	53	64
St. Johnsville.....	79	81	88	87	81	81	85	82	83	75	79	74	75	84
Rome.....	65	64	63	69	64	60	59	64	65	64	66	62	59	57
Champlain Valley..	76	77	82	84	75	78	80	78	79	71	73	71	71	80
Plattsburgh Bar'ks	63	60	58	67	59	53	53	57	61	56	62	58	54	54
Ticonderoga.....	77	78	82	86	60	80	83	84	85	75	78	75	78	84
Glens Falls.....	57	55	63	59	52	56	56	58	57	60	54	50	56	61
Lake George.....	68	69	69	71	67	68	68	70	70	68	69	67	63	68
Plattsburgh Bar'ks	74	75	80	82	72	77	80	82	80	80	77	73	75	75
Ticonderoga.....	62	62	60	60	54	57	56	58	57	57	60	61	55	55
Glens Falls.....	76	80	85	81	76	80	80	83	81	80	76	77	74	81
Lake George.....	61	59	60	67	61	62	54	61	60	58	62	60	54	60
Plattsburgh Bar'ks	81	81	69	80	76	83	81	84	80	80	81	75	72	80
Ticonderoga.....	60	56	67	60	59	50	60	54	60	56	63	60	48	55
Lake George.....	71	79	82	77	76	81	81	80	80	77	75	77	73	78
Plattsburgh Bar'ks	61	58	59	64	59	53	52	60	60	67	60	56	49	57

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
69	68	60	57	59	55	56	59	58	59	61	57	59	61	62	61	56	61.9
71	74	64	64	69	60	69	70	62	60	67	64	67	67	78	65	63	61.0
59	60	52	50	50	40	46	50	43	50	52	52	52	45	50	52	46	
83	77	60	70	70	65	73	73	67	61	70	69	76	70	81	70	69	62.0
59	54	49	50	50	45	46	38	45	51	50	43	55	50	54	41	41	
87	82	67	70	77	97	75	78	69	61	72	70	78	73	79	73	71	64.2
60	59	51	48	45	44	40	50	50	56	57	49	42	56	48	53	47	
80	85	79	60	71	74	64	72	74	69	63	70	68	75	70	76	61	
56	58	56	45	46	49	38	41	54	53	58	43	40	50	47	55	41	62.4
77	80	72	59	58	.....	61	68	72	65	61	65	66	74	68	75	75	61.2
58	58	54	43	50	.....	40	48	49	54	56	46	44	47	48	50	50	
80	76	65	70	71	63	72	76	68	69	70	70	78	69	79	71	69	62.8
62	62	55	51	49	46	49	44	45	54	51	49	44	57	44	55	43	
77	73	62	65	66	66	69	71	65	65	67	65	72	66	75	69	65	60.2
60	60	52	49	52	48	43	43	48	53	52	44	42	52	45	43	40	
76	75	68	67	69	68	66	73	67	67	69	69	68	72	68	72	67	70.0
85	86	80	79	78	78	79	82	70	74	73	78	79	83	80	81	78	
71	67	64	62	63	68	59	69	63	64	62	64	60	66	61	64	56	71.9
82	83	73	77	77	75	75	76	69	72	78	76	75	80	78	81	75	
73	68	64	63	66	65	62	62	62	62	62	65	64	67	60	66	63	71.0
83	84	76	77	78	77	79	80	80	74	80	80	79	82	78	85	78	
67	63	58	62	64	55	63	58	63	60	64	55	59	60	61	60	57	70.7
81	81	76	78	78	76	77	92	70	76	78	78	82	81	82	.....	82	68.4
69	65	55	50	55	50	45	65	60	61	57	56	66	55	54	.....	53	
82	82	75	75	75	74	76	78	70	71	78	75	76	79	75	80	73	
71	68	62	58	63	64	53	65	65	63	60	63	54	67	62	64	61	70.0
83	81	74	71	75	73	75	77	69	68	77	75	75	80	77	80	74	
67	65	60	53	54	57	46	66	55	60	56	60	48	61	53	60	51	67.5
88	86	78	77	79	78	79	82	80	73	81	78	80	82	82	81	80	
62	67	58	55	58	60	48	68	59	62	59	60	50	61	53	56	57	70.2
76	72	67	64	67	65	62	72	62	64	66	66	66	70	68	69	63	68.6
83	82	74	75	80	72	78	82	70	68	76	76	78	79	80	76	76	
66	66	58	54	61	56	51	55	50	60	62	57	53	62	56	59	54	70.0
85	80	71	73	77	72	74	82	69	67	78	72	74	77	74	76	70	
67	65	58	51	55	53	46	65	50	58	57	54	48	60	53	53	49	66.4
85	84	75	75	78	75	78	81	70	70	79	75	78	80	79	79	75	
64	52	66	49	53	53	43	63	50	53	58	53	54	57	59	59	48	67.3
82	81	74	74	73	73	75	79	70	68	76	74	76	80	78	72	76	68.8
67	66	62	53	62	58	50	66	53	63	61	54	52	62	55	62	52	
85	84	82	76	79	79	76	77	81	72	69	79	80	80	82	85	81	71.2
70	65	64	56	56	63	50	68	56	60	57	68	65	64	66	67	55	
86	84	72	75	78	74	78	81	68	70	79	77	86	81	82	80	74	
66	61	55	52	57	52	47	62	54	55	59	56	48	53	55	60	51	67.9
75	70	60	63	63	58	63	64	62	61	62	60	63	62	66	63	60	65.9
86	81	66	72	71	65	75	75	66	62	69	71	77	70	80	69	70	
64	56	59	54	54	45	58	54	58	57	50	50	56	51	52	49	52	65.4
88	83	72	74	72	67	77	72	70	68	75	72	79	73	81	72	72	
66	66	62	55	54	60	55	57	58	63	60	50	51	61	55	59	49	68.8
85	80	68	70	74	65	74	75	67	63	69	69	76	74	77	75	70	
61	64	63	49	50	48	42	54	55	58	58	48	45	56	50	58	47	64.8
88	75	65	75	76	70	74	75	67	67	75	76	70	72	75	73	70	
60	55	48	56	52	44	51	50	56	51	41	46	53	47	56	45	50	64.6
71	72	65	61	63	62	60	66	58	58	63	62	61	66	65	68	62	65.7
74	82	78	67	73	68	77	77	74	64	62	74	71	73	76	78	73	65.2
62	60	58	52	50	55	52	53	44	46	52	54	49	52	56	60	55	
86	82	70	73	77	71	74	80	66	61	75	72	75	77	78	72	74	66.8
60	66	62	52	52	57	48	54	45	55	56	51	48	59	54	63	50	
85	80	73	68	70	70	74	78	72	61	72	73	75	78	76	78	76	
60	62	50	50	49	49	42	55	43	56	58	48	47	56	53	57	45	65.5
82	81	71	71	76	71	73	79	68	61	72	73	74	75	75	76	74	
80	62	54	52	53	50	45	53	49	57	55	50	48	56	54	57	48	65.3

TEMPERATURE—AUGUST, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Val.</i>	68	69	71	71	68	67	68	69	70	67	66	63	61	68
Madison Barracks.....	73	78	83	87	80	78	84	83	85	84	77	75	78	73
Canton.....	60	58	56	60	55	41	47	58	46	46	48	48	43	43
North Hammond.....	80	85	87	74	78	83	86	83	83	75	76	70	72	81
Ogdensburg.....	80	55	58	61	54	51	55	55	61	55	60	52	47	57
Potsdam.....	80	80	88	82	82	80	78	80	82	78	74	72	70	80
Great Lakes.....	60	60	58	66	56	56	58	58	58	60	58	58	50	58
Westfield.....	75	82	81	80	80	80	80	79	82	74	75	71	74	80
Buffalo.....	60	59	61	65	57	60	59	61	60	62	62	56	38	61
Pittsford.....	75	79	82	76	73	78	82	80	81	80	74	74	85	86
Rochester.....	59	57	59	63	62	61	53	50	49	58	55	54	55	58
Appleton.....	67	68	73	72	68	68	70	72	70	70	68	66	64	72
Fort Niagara.....	78	80	84	80	75	78	79	79	79	75	76	74	76	84
Baldwinsville.....	55	58	64	60	63	53	56	62	59	58	66	57	48	58
Ridgeway.....	76	82	85	81	74	77	81	80	80	76	75	72	72	84
Oswego.....	62	63	66	67	64	62	62	68	61	61	64	57	56	66
Palermo.....	74	82	87	77	73	78	81	83	82	79	74	71	75	83
Lyons.....	59	55	60	64	59	53	55	57	59	61	58	55	51	65
Erie, Pa.....	76	80	88	76	74	81	85	85	82	80	75	73	76	84
Central Lakes.....	61	58	64	65	63	55	57	62	61	62	60	58	51	59
Fleming.....	78	77	78	75	74	80	78	82	78	81	75	74	78	85
Watkins.....	63	76	60	62	61	56	56	59	57	61	58	55	49	55
Romulus.....	78	74	80	80	76	85	88	85	81	80	76	74	77	85
Ithaca.....	60	60	63	66	66	58	61	65	61	60	61	57	51	60
Penn Yan.....	78	84	80	83	77	82	85	83	85	79	75	78	78	86
Mean.....	61	57	62	66	61	57	57	60	59	64	61	58	53	59
	75	78	82	76	73	79	79	80	79	76	73	75	75	82
	59	59	61	64	63	57	59	61	60	62	60	58	52	60
	69	73	82	74	72	75	78	80	78	74	71	72	73	78
	61	58	62	65	63	62	58	62	60	64	61	61	60	60
	75	80	87	78	73	79	82	82	81	78	74	75	74	83
	62	58	62	67	61	58	57	60	60	66	61	60	54	57
	76	76	83	82	72	75	80	77	78	73	75	71	74	84
	59	60	67	67	63	58	60	65	62	64	63	63	53	62
	63	68	74	74	68	66	70	70	72	70	67	67	63	72
	72	78	86	81	72	76	81	81	83	77	72	74	75	84
	62	59	64	67	62	56	58	64	62	66	61	58	52	66
	74	81	89	84	74	79	82	80	84	77	77	79	79	86
	62	54	59	64	63	51	52	59	60	63	57	56	49	55
	75	80	89	88	77	82	85	83	81	76	76	79	76	86
	60	58	61	65	60	54	67	60	60	63	60	58	51	59
	75	80	83	82	72	75	80	78	80	74	73	76	76	83
	62	55	59	61	59	51	51	58	61	63	58	55	53	55
	75	82	84	86	75	80	83	80	83	75	75	79	72	85
	58	57	61	64	62	56	57	61	63	62	60	59	50	60

† Max. and Min. by the Draper Thermograph. || Received too late to be used in computing conduit, nine miles north of city.

THE REGIONS AND DAILY MAXIMA AND MINIMA FOR THE
—(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
71	70	66	62	61	58	58	58	56	58	64	62	65	62	65	64	61	64.9
86	81	78	72	75	68	69	74	83	72	76	71	78	82	74	85	72	63.5
50	53	57	41	43	40	39	42	35	45	51	49	49	56	53	53	56	
82	80	79	75	69	69	72	70	65	68	76	75	80	75	81	74	72	
63	65	53	50	53	45	43	51	41	49	50	44	47	52	57	53	41	64.8
84	80	70	68	66	68	62	66	70	74	72	76	74	74	76	70	70	
64	64	58	56	56	50	50	50	44	48	66	62	62	60	54	54	44	65.8
79	80	80	81	65	68	73	62	69	74	73	71	78	75	80	75	73	
66	60	56	52	56	47	49	54	44	47	53	52	52	55	55	55	54	65.8
80	76	89	78	75	77	75	70	67	69	72	69	77	71	73	75	78	
55	64	54	51	49	50	47	38	40	39	52	51	50	52	49	51	48	64.7
72	68	63	63	62	59	61	65	60	63	65	61	67	61	70	65	62	66.6
80	72	67	69	70	68	72	73	70	72	68	68	76	75	82	75	76	
65	60	58	47	60	50	50	53	56	55	55	48	58	54	57	55	55	65.8
78	70	67	70	65	65	70	74	70	72	68	69	74	70	80	67	70	
62	59	56	60	58	54	53	58	56	54	59	55	60	60	61	56	59	67.0
89	75	70	74	65	57	74	76	65	72	72	74	83	71	83	75	74	
67	60	55	52	54	49	43	55	50	55	63	50	50	55	53	56	48	
79	74	70	73	63	68	74	78	65	72	72	70	80	72	84	72	73	67.0
67	59	56	54	57	59	49	58	56	57	58	50	53	55	57	56	51	
82	75	69	73	66	67	71	73	63	69	70	70	79	71	82	74	71	65.1
67	60	56	48	55	54	46	50	54	47	60	48	52	57	56	57	48	
80	81	71	75	70	79	74	75	67	75	72	74	82	77	83	80	75	
69	62	64	54	55	57	51	56	54	50	60	50	58	55	63	58	53	68.0
80	81	70	76	74	69	77	78	70	76	75	73	82	72	83	75	74	67.6
65	60	58	51	58	53	51	56	51	59	58	53	59	56	52	56	52	
78	74	69	73	64	67	72	76	64	72	71	71	79	73	81	75	73	66.1
68	62	50	53	57	51	51	55	55	50	61	50	55	56	59	51	51	
78	75	67	74	63	64	69	71	66	67	69	67	81	67	81	74	64	
68	64	58	52	55	52	50	56	54	59	60	54	53	56	54	57	52	66.0
79	79	69	74	72	66	75	76	68	72	74	70	81	72	82	73	74	67.0
67	62	58	55	58	53	48	56	53	59	57	54	52	54	55	58	54	
77	70	67	72	68	66	71	73	67	73	68	69	75	74	82	67	71	67.0
60	61	60	57	60	51	50	57	58	59	60	53	60	59	62	56	53	
74	70	62	64	66	60	62	67	60	66	67	61	67	65	68	66	62	66.9
80	78	68	73	74	65	75	74	67	72	70	70	80	72	82	74	74	67.0
70	53	56	55	58	53	50	58	50	61	60	54	55	53	55	60	52	
85	82	72	76	79	71	81	79	68	75	78	72	84	77	85	73	74	67.0
64	60	52	52	54	53	43	55	52	53	61	48	49	55	51	59	43	
78	80	71	75	78	71	77	81	70	72	70	72	82	77	88	75	77	
67	61	55	54	50	52	49	56	50	57	59	57	53	55	51	51	51	67.8
83	79	68	72	75	66	77	76	65	72	75	70	80	74	81	70	72	
67	63	51	51	53	52	46	58	53	60	60	49	52	54	50	54	46	
77	79	72	74	76	70	79	79	68	73	77	72	82	76	82	74	74	
65	63	54	55	55	51	43	54	52	57	59	51	50	53	52	58	49	67.1
73	70	64	62	64	60	61	65	61	62	65	62	64	65	66	66	61	66.0

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir; (2a) Intake

DAILY AND MONTHLY PRECIPITATION

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau.</i>	0.00	0.00	0.07	0.07	0.24	0.00	0.00	0.02	0.01	0.43	0.08	0.04	T.	0.00
Alfred														
Angelica .....				.17					T.		.33			
Bolivar .....				.20	.52					.68	.03	T.		
Franklinville			T.	T.	.23			.01	T.	.90	.10	.01		
Humphrey														
Little Valley														
Cherry Creek .....				.17	.06			.07	.03	.78	.12	.03		
Jamestown .....				.16				.32		.25	.10	.16		
Elmira .....					.90					.35				
Pine City .....			.06		.64					.30		.13		
Akron			T.	T.						T.	.12	T.	.07	
Avon									T.	.16				
Mt. Morris										T.	T.	T.		
Lockport				T.						.23		.03		
Tyrone .....										.45				
Wedgewood .....			.60	.07	.48					.37	.21	.03		
Addison .....			.13		.23					.60	.03			
Atlanta				T.	.48				.07	.76	.14	.05		
Haskinville .....					.75					.38				
South Canisteo .....			.40	.45						.47	.10	T.		
Arade .....				.16				T.		1.04	.20	.27		
<i>Eastern Plateau.</i>	T.	0.00	T.	0.06	0.34	0.01	0.04	0.04	0.03	0.30	0.21	0.14	0.01	0.02
Binghamton (1) .....					.72					.03	.08		T.	
Binghamton (2) .....					.70					.01	.02	.01	T.	
Chenango Forks .....							.75							.25
Oxford .....	.02									T.	.05	T.	.05	
Cortland	T.								.14	.10		.09		
South Kortright .....					.31					.19	2.75	.51		
Bouckville	T.			.10						.07	.07	.34		
Middletown .....			.12					.86		.30	.05			
Port Jervis .....				.90			.02		.25	.18			.07	
Warwick .....				.74				.05	.13	.13	.03	.03	.03	
Copperstown .....				.16					.20	2.15	.13	.60		
Garrattsville .....										.63				
New Lisbon .....				.20						1.08	.29	.47	.01	
Oneonta .....				.43						.31	.09	.65		
Schenevus .....	.03			.44					.02	.03	.29	.27		
Perry City .....				.06	.12					.30	.16	.03		
Newark Valley .....				.90						.24	.05	T.		
Straits Corners			T.		.79					.23	T.	T.		.09
Waverly .....			.02	.03	.58					.23	.08	.01		
Dryden .....			.18	.22	T.	T.				.04	.03	.02	.01	T.
Mohonk Lake					1.03						.19			
<i>Northern Plateau.</i>	T.	0.00	0.60	0.05	0.03	T.	0.00	0.02	0.03	0.79	0.37	0.11	0.03	T.
Elizabethtown														
Lake Placid .....				.07				.10	.05	.31	.02			.02
Saranac Lake .....	.04					T.			.20	.40	.03	.25		.02
Gloversville	T.			.04	.10			.05		.41	.33	.10	.05	
Little Falls (2a) .....				.05		T.			T.	.66	.05	.10		
North Lake										2.36	.25	.17		
Lowville .....										.97	.87	.19	.10	
Number Four										*	+3.58	T.	.14	
Kings Station .....				.30	.10					.50	1.06	.07		
<i>Atlantic Coast</i>	0.00	0.00	0.00	0.11	0.52	0.00	0.00	0.02	0.01	0.06	0.40	T.	0.00	0.04
Brooklyn .....				.20	.80				.06		.28			
Manhattan Beach														
New York City .....				.20	.37				.04	T.	.17	T.		
Willels Point .....				.33	.10					.43		T.		.07

TION FOR AUGUST—(INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.09	0.46	0.04	0.03	0.17	0.04	T.	0.03	0.09	0.20	0.14	0.00	0.06	0.00	0.02	0.14	0.00	2.50
.04	.60	.10		.12	.09				.01	.14					.17		1.77
.27	.60	.12		T.					T.	.54					.30		3.26
.01	.70	.01	.03	.20	.04	.01			T.	.11				T.	.27		2.63
.27	1.05	.17	.09	.30	.04				T.	.31					.57		4.06
.10	.90	.02		.21					T.	.28				T.	.51		2.95
	.53			.20				.58	1.14								3.70
.14	.34			.61				.61	1.00	.07					.10		4.00
T.	*	†.79		T.	.47					.23					.05		1.73
.10	T.			.43						.11					.10		0.90
T.	T.			.20					T.	T.				T.			0.20
.05	.70	.30	.42	.12						.20				.24			2.29
	.10						.35					1.00		.15			2.05
.05	.43		T.	.07			.10	.23	.29	.05					.06		3.04
.05	.30	T.		.04			.10	.08	.46	.03					.10		2.05
	.18	.06		.09					.30	.07					T.		2.20
.11	.35				T.					.20					.10		1.89
.33	.20	T.		T.			.04	.16	.34						.20		2.69
.17	.80		.05	.47	.17				.33					T.	.06		3.62
0.17	0.20	0.03	T.	0.24	0.01	0.02	0.02	0.06	0.97	0.11	T.	T.	0.05	0.00	0.03	T.	3.13
.12	T.			.18	.05				.81	.02					T.		1.84
				.01				T.	.43	T.					.02		1.37
.21	.04			.33			.35						.95				2.30
								.10	1.80	.08							2.68
*	†.53	.08		.50					.41	.22							2.07
.31	.21			.33					1.42								6.03
.17	.08	.29		.35			.09		.37	T.							1.93
.15	.54						.07		1.76								3.85
	.19			.05			.05	.02	1.66	.26							3.65
.16	.24						.13		1.45								2.99
	.54			.40					2.12	.30							6.60
T.	1.05			.36					1.15	1.05					.07		4.31
	.10	.04		.23					.75								3.17
	.04			.34				.38	.14	.05							2.43
.10	.12	.03		.35	.05				.66	.01					T.		2.40
T.	.32			.30			.02	.25	.55	.03					.07		2.30
.50	.25			.20				.08	1.28	.05					.16		3.71
.10				.15				.08	1.06	T.					.16		2.66
.47	.17			.17				.36	.97	.03		T.			.09		3.21
.03	.08	.08	T.	.62	.03	T.	.04		.62	.16	T.	.01			.05	T.	2.22
1.00								*	†1.89								4.11
0.30	0.27	0.19	0.01	0.19	T.	0.00	0.02	0.07	0.43	0.12	T.	T.	T.	0.12	0.10	0.00	3.47
	.28	.01					.15			.15		.02					1.23
.24	.40			.20				.22	.04	.24			T.		.28		2.56
.44	.14	.02	.02	.38	.01		.03	T.	1.27	.06	.01						3.46
	.06	1.10	.07	.25				.34	.31	.20					.25		3.44
.28	.80			.52					.20	.09					.40		4.97
.16	.07	.13		.03					.15	.18					.37		3.27
.15	*	†.43		.08					.14						.45		4.97
1.11	.14			.06					1.30	.06							4.70
0.25	0.69	0.01	0.06	T.	0.00	0.02	0.39	0.07	0.74	0.14	0.01	0.00	0.00	0.00	0.00	0.00	3.53
	.50	.08		T.			.15	.05	1.30	.60	.05						4.07
.02	.42	T.	.01	.01		T.	.61	.05	1.10	.12	.02						3.14
.65	.05		.06			T.	T.	.28	.06	.23							2.26

DAILY AND MONTHLY PRECIP.

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan. Coast (Con.)</i>														
Brentwood					.50				T.		.50			.20
Setauket					.40						1.30			
Bedford				.02	.91				T.		.29			
Prinrose					.51			.11		T.	.26			T.
<i>Hudson Valley</i>	T.	0.00	0.00	T.	0.48	0.00	T.	0.00	T.	0.05	0.70	0.21	0.13	0.00
Albany	T.				.23	.00			T.	T.	1.45	.01		
Cedar Hill	.01				.45	.02	.01				.02	.95	.01	1.01
Honeymead Brook				T.	.40	.05					.14	.02	.75	
Poughkeepsie					.18						.32	T.	.44	T.
Wappingers Falls														
Catskill	T.				.39	T.				.15	.41	T.		
West Point					1.40				.01		.63			
Boyd's Corners														
Carmel				.03	.61				T.		1.64			
<i>Southeast Reserve</i>														
Eagle Mills					.27	.10					.50	.50		
Easton														
Greenwich														
<i>Mohawk Valley</i>	0.0	0.00	0.00	0.00	0.05	0.00	0.0	0.60	0.01	0.09	0.31	0.12	T.	0.00
Little Falls (a)											.28	.05		
Cornjharie					.11						.87	.02	.10	
St. Johnsville					.03					.03	.64	.93	.22	.01
Rome											.50		.11	
<i>Champlain Valley</i>	0.14	0.12	0.00	0.16	0.02	0.00	0.00	0.00	0.10	.08	0.98	0.30	0.00	T.
Plattsburg Bar'cks	.30	.50							.40	.12	.25	.60		
Ticonderoga	.20				.01					.08	1.55	.07		
Glens Falls				.55	.08					.07	1.05	.50		
Lake George	.05	T.		.08					T.	.04	1.05	.04		.01
<i>St. Lawrence Valley</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.42	0.57	0.26	T.	0.00
Madison Barracks										1.10	.05	.07		
Watertown														
Canton										.92	1.07	.39		
<i>De Kath Junction</i>										.27	.43	.71		
North Hammond										.18	.86	.05		
Ogdensburg										.03	.45	.10	T.	
Potsdam											*	†1.00		
<i>Great Lakes</i>	T.	0.00	T.	0.03	T.	0.04	0.00	0.00	0.03	0.43	0.11	0.09	T.	0.01
Westfield										1.08		.22		
Buffalo			T.	T.						.34	T.	.08		
Adams Centre	.06		.03						.04	2.33		.05	.03	
<i>Pittsford</i>										.50	.02			
Rochester				T.	T.					.91	.09			
Scot'sville											.44			
<i>Appleton</i>				T.						.24				
Fort Niagara				.12						.32		.11		
Niagara Falls				.08						.29				
<i>Baldwinsville</i>				T.						T.	.64	T.		
Skaneateles					.02					.02	.27	.45	.02	
Lyndonville										.35				
<i>Ridgeway</i>				.06						.14	.01			
Fulton						.80			.05		.10	.50		.20
Oswego				T.						.53	.18	.01		
Palermo														
<i>Phoenix</i>	T.										.12	.30		
Lyons				T.						.24	.10			
Rose										.30	.05	T.		
Erie, Pennsylvania				.40	T.					.98	.01			T.

TATION FOR AUGUST—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.60	.....	.....	T.	.....	.....	.....	.....	.....	.30	T.	.....	.....	.....	.....	.....	.....	2.10
.09	2 12	.....	.16	.....	.....	.....	.20	T.	.76	T.	.....	.....	.....	.....	.....	.....	5.63
.06	.62	.....	.05	T.	.....	.....	1.69	.61	.55	.03	.....	.....	.....	.....	.....	.....	4.26
.32	1.10	.....	.11	.....	.....	.16	.05	.10	1.08	.03	.....	.....	.....	.....	.....	.....	3.83
0.52	0.15	0.01	0.05	0.16	0.11	0.00	0.49	0.01	1.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00	4.54
.13	T.	T.	.....	.31	.10	.....	.33	.....	1.71	T.	.....	.....	.....	.....	.....	.....	4.43
.68	.03	.....	.....	.51	.07	.....	.12	.....	1.25	T.	.....	.....	.....	.....	.....	.....	5.14
.60	.18	.....	.....	.08	.01	.....	.70	.02	1.38	.....	.....	.....	.....	.....	.....	.....	4.42
T.	T.	.....	.....	.....	.....	.....	1.80	.08	.03	T.	.....	.....	.....	.....	.....	.....	2.81
.....
1.98	.05	.....	.....	.32	.....	.....	.60	.....	1.04	.09	.....	.....	.....	.....	.....	.....	4.13
1.45	.....	.....	T.	.....	.....	.....	.03	.....	1.60	.....	.....	.....	.....	.....	.....	.....	5.15
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.63
.21	.95	.....	.43	.....	.....	.....	.16	.....	.87	.....	.....	.....	.....	.....	.....	.....	4.90
.....
.....	T.	.06	.....	.08	.70	.....	.....	.....	1.40	.02	.....	.....	.....	.....	.....	.....	5.21
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.63
.....
0.06	0.49	0.01	T.	0.23	0 00	0.00	0.02	0.15	0.48	0.03	0.00	0.00	0.00	0.04	0.00	0.00	2.87
.....	.28	.....	.....	.13	.....	.....	.....	.40	.60	.03	.....	.....	.....	.....	.....	.....	2.52
.21	.33	T.	T.	.23	.....	.....	.....	T.	1.01	.10	.....	.....	.....	.....	.....	.....	2.98
.04	.....	.....	.....	.29	.....	.....	.08	.....	.95	.....	.....	.....	.....	.....	.....	.....	3.28
.....	1.35	.05	.....	.28	.....	.....	.....	.21	.03	.....	.....	.....	.....	.18	.....	.....	2.71
0.36	0.55	0.09	0.01	0.38	T.	0.11	0.00	0.00	0.70	0.24	0.66	0.00	0.00	0.00	0.03	0.00	4.43
.....	.40	.30	.....	.....	.....	.43	.....	.....	.....	.35	.22	.....	.....	.....	.05	.....	3.93
.15	.26	.01	.02	.12	.....	.....	.....	.....	.70	.13	.....	.....	.....	.....	.04	.....	3.34
.29	1 07	.....	.02	.50	.....	.....	.....	.....	.99	.20	.....	.....	.....	.....	T.	.....	5.42
.92	.46	.04	.01	.91	.02	.....	.....	.....	1.10	.27	.....	.....	.....	.....	.02	.....	5.02
0.03	0.01	0.14	0.00	0.35	?	T.	T.	0.00	0.13	0.10	0.00	0.00	0.00	0.09	0.07	0 00	2.21
.02	.....	.05	.....	.05	.....	.....	.....	.....	.06	.....	.....	.....	.....	.50	.....	.....	1.90
.....	.....	.31	.....	.34	.....	.....	.....	T.	.....	.05	.....	.....	.....	.....	.25	.....	3.33
.....	.....	.23	.....	.49	.....	.....	.....	.....	.....	.23	.....	.....	.....	.....	.10	.....	2.46
.05	.05	.05	.....	.56	.....	.....	.....	.....	.....	.34	.....	.....	.....	.....	.05	.....	2.19
.11	.02	.02	.....	.30	T.	.....	.....	.....	.30	.04	.....	.....	.....	.....	.03	.....	1.40
.....	.....	.15	.....	* 7.42	.....	.....	.....	.....	.38	.....	.....	.....	.....	.....	.04	.....	1.99
0.22	0.39	0.13	0.03	0.26	0.01	T.	T.	0.04	0.10	0.11	T.	0.00	0.00	0.07	0.18	0.00	2.17
.77	.50	.....	.30	.19	.....	.....	.....	.....	.09	.....	.....	.....	.....	.....	.49	.....	3.64
.15	.78	T.	.02	.62	.....	.....	.....	.....	.....	.05	.....	.....	.....	.....	.08	.....	2.12
.....	.....	.....	.....	.17	.03	.....	.....	.....	.....	.46	.....	.....	.....	.34	.....	.....	3.54
.05	.01	T.	.01	.39	.....	.....	.....	.....	.....	.11	.....	.....	.....	.....	.04	.....	1.13
.01	.27	.08	.01	.20	.....	.....	.....	.....	.....	.10	.....	.....	.....	T.	.01	.....	1.72
.11	.04	T.	.....	.24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.83
.06	.96	.03	.....	.45	.....	.....	.....	.....	.....	.15	.....	.....	.....	.....	.25	.....	2.14
.06	.60	.....	.....	.33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.40	.....	.....	1.94
.11	1.49	.38	.....	.61	.....	.....	.....	.....	T.	.09	.....	.....	.....	.....	.33	.....	3.38
.92	.07	.....	.....	.66	.....	.....	.....	.70	.03	T.	.....	.....	.....	.21	.....	.....	2.63
.11	.10	.28	.08	.19	.....	.....	.....	.....	.50	.05	.....	.....	.....	.....	.....	.....	2.09
.17	.77	.05	.....	.50	.....	.....	.....	.....	.....	.18	.....	.....	.....	.....	.30	.....	2.32
.06	.49	.13	.02	.41	.....	.....	.....	.....	.....	.22	.....	.....	.....	.....	.29	.....	1.83
.02	.....	.96	.....	.02	.....	.....	.....	.16	.05	.16	.....	.....	.....	.....	.....	.....	3.03
.15	.05	.01	T.	.06	.06	.....	.....	.....	.01	.18	T.	.....	.....	.....	.46	.....	1.70
.....
.08	.05	.45	.....	.05	.04	.....	.....	.....	1.16	.02	T.	.....	.....	.....	.26	.....	2.53
.24	.07	.....	.....	.19	.....	.01	.06	.....	.....	.....	.....	.....	.....	.....	T.	.....	1.22
.19	.09	.03	T.	.15	.04	.....	.....	T.	.....	.02	.....	.....	.....	.....	.27	.....	1.15
1.00	1.11	.....	.09	.14	T.	.....	.....	T.	.....	.27	.....	.....	.....	T.	.70	.....	4.70

DAILY AND MONTHLY PRECIPITA

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.00	0.00	0.07	0.12	0.16	0.00	0.00	0.00	T.	0.08	0.18	0.12	0.00	0.00
Fleming.....				.45						T.	.73	.57		
Sherwood.....				.02	.01	.28				.05	.20	.07		
Watkins.....										.24	.01	.01		
Romulus.....				T.	.18					T.	T.	.02		
Ithaca.....			.40	T.	.51				T.	.12	.14	T.		
Penn Yan.....				.26						.06	T.	.02		
Average.....	0.01	0.01	0.01	0.06	0.18	0.01	T.	0.01	0.02	0.34	0.39	0.14	0.02	0.01

‡ Record for the month incomplete. ¶ Received too late to be included in the averages.
 polated from values at other stations.

TION FOR AUGUST—(*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.04	0.18	0.03	T.	0.21	0.00	0.00	0.02	0.12	0.43	T.	0.00	0.00	0.00	0.00	0.01	0.00	1.78
T.	.30	.....	.....	.40	.....	.....	.....	.....	.52	.....	.....	.....	.....	.....	.....	.....	2.52
.12	.28	.....	.....	.21	.....	.....	.....	.50	.08	.....	.....	.....	.....	.....	.03	.....	1.99
.03	.27	.....	.01	.02	.....	.....	.09	.10	.27	.01	.....	.....	.....	.....	.....	.....	1.37
T.	T.	.13	.....	.14	.....	.....	.....	T.	.31	T.	.....	.....	.....	.....	.....	.....	0.78
.02	.16	.06	.....	.45	.....	.....	.03	.15	.65	.02	.....	.....	.....	.....	.03	.....	2.74
.07	.10	.....	.....	.04	.....	.....	.....	T.	.73	.....	.....	.....	.....	.....	T.	.....	1.28
0.20	0.40	0.07	0.02	0.22	0.02	0.02	0.10	0.66	0.53	0.10	0.01	0.01	T.	0.03	0.06	T.	3.06

* Amount included in next measurement. † Not included in computing averages. § Inter-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).									
		Normal for the month of August.	Length of record, years.	Record begins.	Record ends.	Mean for August, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR AUGUST.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		66.2	...	...	...	65.1	-1.6	...	...	...	...
Angelica	Allegany	61.7	15	1854	1897	62.6	-2.1	69.2	1872	61.5	1889
Humphrey	Cattaraugus	65.3	14	1883	1896	...	...	66.7	1888	62.8	1886
Elmira	Chemung	68.7	19	1851	1897	67.6	-1.1	71.9	1895	63.1	1851
<i>Eastern Plateau.</i>		65.6	...	...	...	64.7	-0.9	...	...	...	...
Oxford	Chenango	65.7	30	1878	1897	61.8	-0.9	70.8	1831	61.8	1851
Cortland	Cortland	61.5	35	1829	1897	61.2	-0.3	69.3	1863	60.0	1851
Cooperstown	Otsego	65.5	44	1851	1897	63.8	-1.7	71.5	1877	61.0	1866
Waverly	Tioga	66.7	16	1882	1897	66.0	-0.7	70.2	1896	64.0	1883
<i>Northern Plateau.</i>		64.7	...	...	...	62.8	-1.9	...	...	...	...
Lowville	Lewis	64.7	30	1827	1897	62.8	-1.9	68.8	1831	60.5	1848
<i>Atlantic Coast.</i>		71.5	...	...	...	70.5	-1.0	...	...	...	...
New York city	New York	72.4	27	1871	1897	71.0	-1.4	76.0	1872	70.4	1879
Setauket	Suffolk	70.6	13	1885	1897	70.0	-0.6	72.2	1896	68.8	1889
<i>Hudson Valley.</i>		70.3	...	...	...	69.2	-1.1	...	...	...	...
Albany	Albany	70.6	24	1874	1897	70.0	-0.6	73.3	1881	67.2	1885
Honey-mead Brook	Dutchess	68.1	17	1881	1887	66.4	-1.7	73.7	1882	66.1	1886
West Point	Orange	72.2	68	1826	1897	71.2	-1.0	...	...	...	...
<i>Champlain Valley.</i>		67.5	...	...	...	65.2	-2.3	...	...	...	...
Plattsburgh Barracks.	Clinton	67.5	41	1839	1897	65.2	-2.3	71.7	1813	64.2	1894
<i>St. Lawrence Valley.</i>		67.9	...	...	...	64.7	-3.2	...	...	...	...
Madison Barracks.	Jefferson	68.6	35	1839	1897	63.5	-5.1	74.7	1876	63.5	1897
Canton	St. Lawrence	67.4	35	1862	1897	64.8	-2.6	74.0	1876	62.7	1866
North Hammond	"	69.3	19	1866	1897	65.8	-3.5	77.2	1873	61.8	1866
Potsdam	"	66.4	28	1878	1897	64.7	-1.7	70.5	1846	60.5	1833
<i>Great Lakes.</i>		68.4	...	...	...	67.1	-1.5	...	...	...	...
Buffalo	Erie	68.7	27	1871	1897	67.0	-1.7	73.5	1872	64.7	1885
Rochester	Monroe	68.8	26	1871	1897	67.0	-1.8	73.3	1876	63.8	1885
Fort Niagara	Niagara	69.6	41	1842	1897	68.0	-1.6	74.6	1876	64.3	1866
Baldwinsville	Onondaga	67.0	20	1851	1897	67.6	+0.6	71.1	1896	63.7	1866
Oswego	Oswego	68.2	27	1871	1897	66.0	-2.2	73.1	1872	63.2	1885
Palermo	"	67.6	43	1851	1896	...	...	71.6	1887	61.6	1885
Erie, Pennsylvania	Erie	69.2	24	1874	1897	67.0	-2.2	73.0	1871	65.0	1885
<i>Central Lakes.</i>		67.6	...	...	...	65.8	-1.8	...	...	...	...
Ithaca	Tompkins	67.6	19	1879	1897	65.8	-1.8	71.5	1881	64.6	1885
Average departure		...	...	...	...	...	-1.7	...	...	...	...

AND PRECIPITATION—AUGUST.

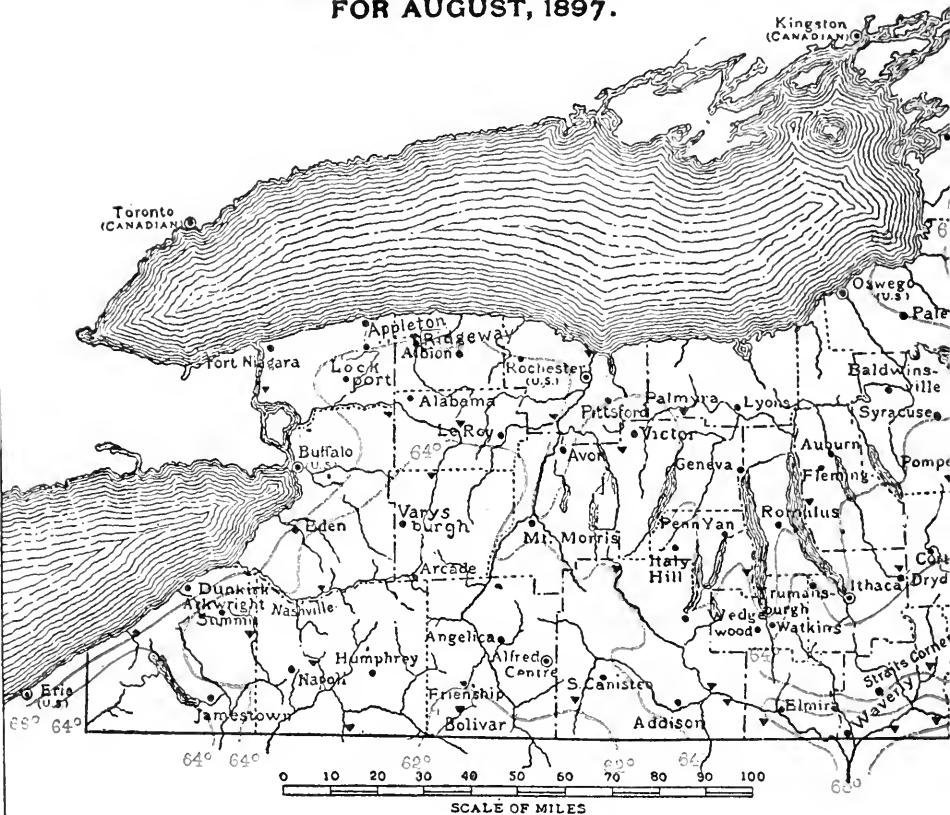
STATION.	COUNTY.	PRECIPITATION — (INCHES).									
		Average for the month of August.	Length of record, years.	Record begins.	Record ends.	Total for August, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR AUGUST.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau.</i>		3.82	...	...	...	2.21	-0.78	...	...	...	...
Angelica.....	Allegany.....	3.74	13	1856	1897	1.77	-1.97	6.72	1890	1.77	1897
Humphrey.....	Cattaraugus.....	4.45	14	1883	1896	...	...	10.11	1885	1.63	1889
Elmira.....	Chemung.....	3.25	18	1851	1897	3.70	+0.42	6.45	1860	0.94	1896
<i>Eastern Plateau.</i>		3.71	...	...	...	3.64	-0.07	...	...	...	...
Oxford.....	Chenango.....	3.51	27	1829	1897	2.68	-0.83	5.38	1823	0.83	1830
Cortland.....	Cortland.....	3.17	19	1851	1897	2.07	-1.40	5.49	1859	1.45	1894
Cooper-town.....	Otsego.....	4.14	44	1854	1897	6.60	+2.46	9.46	1856	0.63	1876
Port Jervis.....	Orange.....	4.17	13	1880	1897	3.65	-0.52	8.14	1895	1.32	1883
Waverly.....	Tioga.....	3.26	16	1882	1897	3.21	-0.05	6.31	1891	1.23	1889
<i>Northern Plateau.</i>		3.26	...	...	...	3.27	+0.01	...	...	...	...
Lowville.....	Lewis.....	3.26	33	1827	1897	3.27	+0.01	8.76	1892	0.91	1846
<i>Atlantic Coast.</i>		4.50	...	...	...	4.08	-0.42	...	...	...	...
New York city.....	New York.....	4.56	27	1871	1897	3.14	-1.42	10.42	1875	1.18	1886
Setauket.....	Suffolk.....	4.44	13	1885	1897	5.03	+0.59	6.65	1893	2.35	1896
<i>Hudson Valley.</i>		4.29	...	...	...	4.49	+0.20	...	...	...	...
Albany.....	Albany.....	3.99	24	1871	1897	4.43	+0.44	7.58	1895	0.53	1876
Honey-mead Brook ..	Dutchess.....	4.21	17	1881	1897	4.42	+0.21	8.55	1885	0.96	1894
Poughkeepsie.....	".....	3.86	21	1830	1897	2.81	-1.05	8.67	1831	1.04	1894
West Point.....	Orange.....	4.73	50	1840	1897	5.15	+0.42	11.75	1868	0.05	1876
Boyd's Corners.....	Putnam.....	4.66	27	1870	1897	5.61	+0.97	10.23	1875	1.20	1876
<i>Champlain Valley.</i>		3.15	...	...	...	3.93	+0.78	...	...	...	...
Plattsburgh Barracks..	Clinton.....	3.15	38	1840	1897	3.93	+0.78	7.18	1892	0.37	1876
<i>St. Lawrence Valley.</i> ..		3.20	...	...	...	2.03	-1.17	...	...	...	...
Madison Barracks.....	Jefferson.....	2.43	36	1840	1897	1.90	-0.53	6.14	1871	0.47	1881
North Hammond.....	St. Lawrence..	3.56	20	1866	1897	2.19	-1.37	11.78	1892	0.37	1874
Potsdam.....	".....	3.60	28	1828	1897	1.99	-1.61	9.92	1893	0.31	1845
<i>Great Lakes.</i>		2.68	...	...	...	2.44	-0.38	...	...	...	...
Buffalo.....	Erie.....	2.61	27	1871	1897	2.12	-0.49	10.63	1885	0.05	1876
Rochester.....	Monroe.....	3.00	26	1871	1897	1.72	-1.28	7.26	1886	0.36	1876
Fort Niagara.....	Niagara.....	2.46	40	1842	1897	1.94	-0.52	7.21	1849	0.33	1876
Oswego.....	Oswego.....	2.61	27	1871	1897	1.70	-0.94	6.47	1893	0.29	1874
Palermo.....	".....	2.00	36	1860	1896	...	...	7.45	1892	0.41	1866
Erie, Pennsylvania....	Erie.....	3.29	25	1873	1897	4.70	+1.31	7.97	1885	0.54	1894
<i>Central Lakes.</i>		3.26	...	...	...	2.74	...	...	...	...	...
Ithaca.....	Tompkins.....	3.26	19	1879	1897	2.74	-0.52	8.14	1885	0.39	1881
Average departure.		...	...	...	...	...	-0.28	...	...	...	...

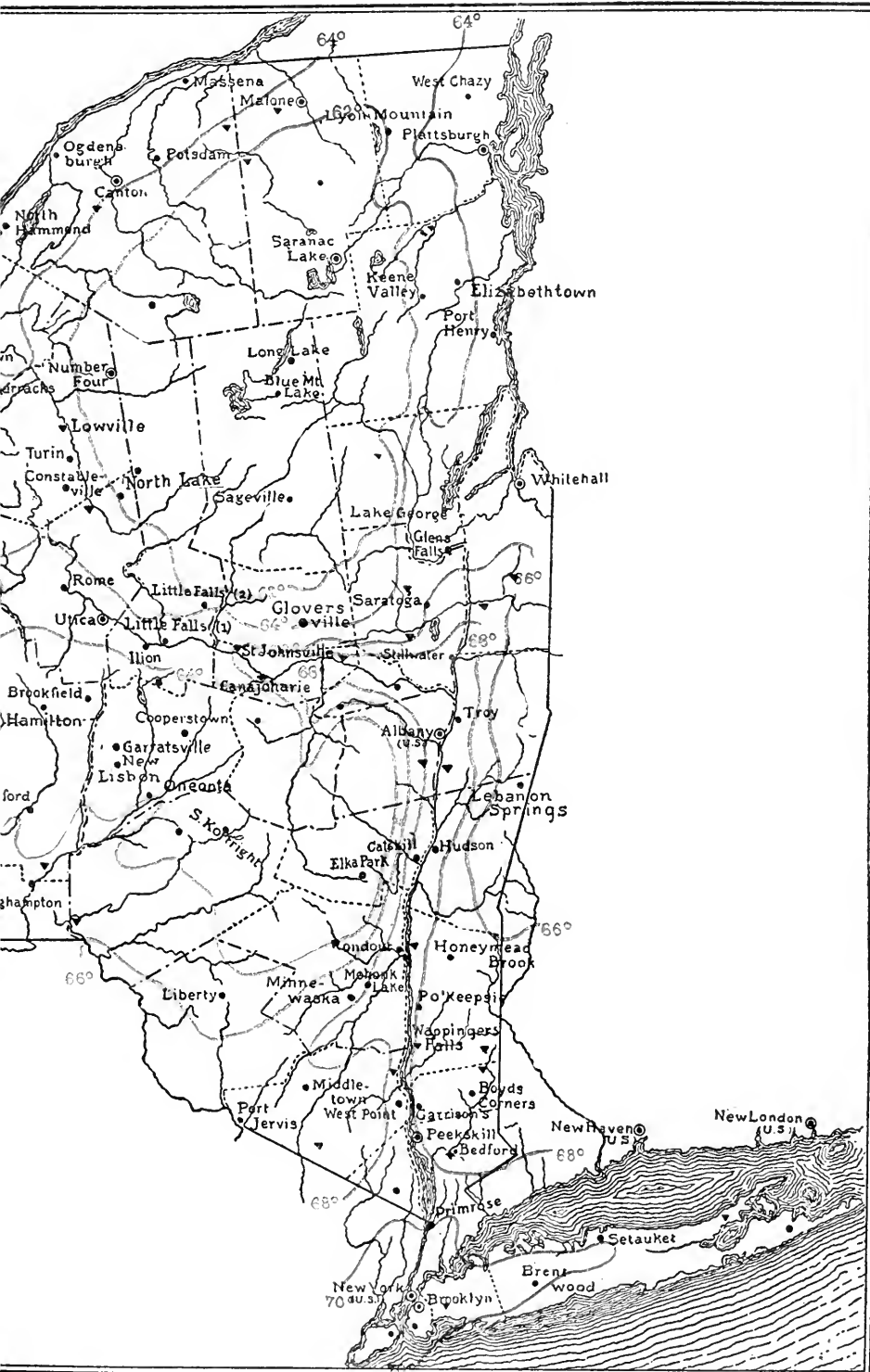
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR AUGUST, 1897.





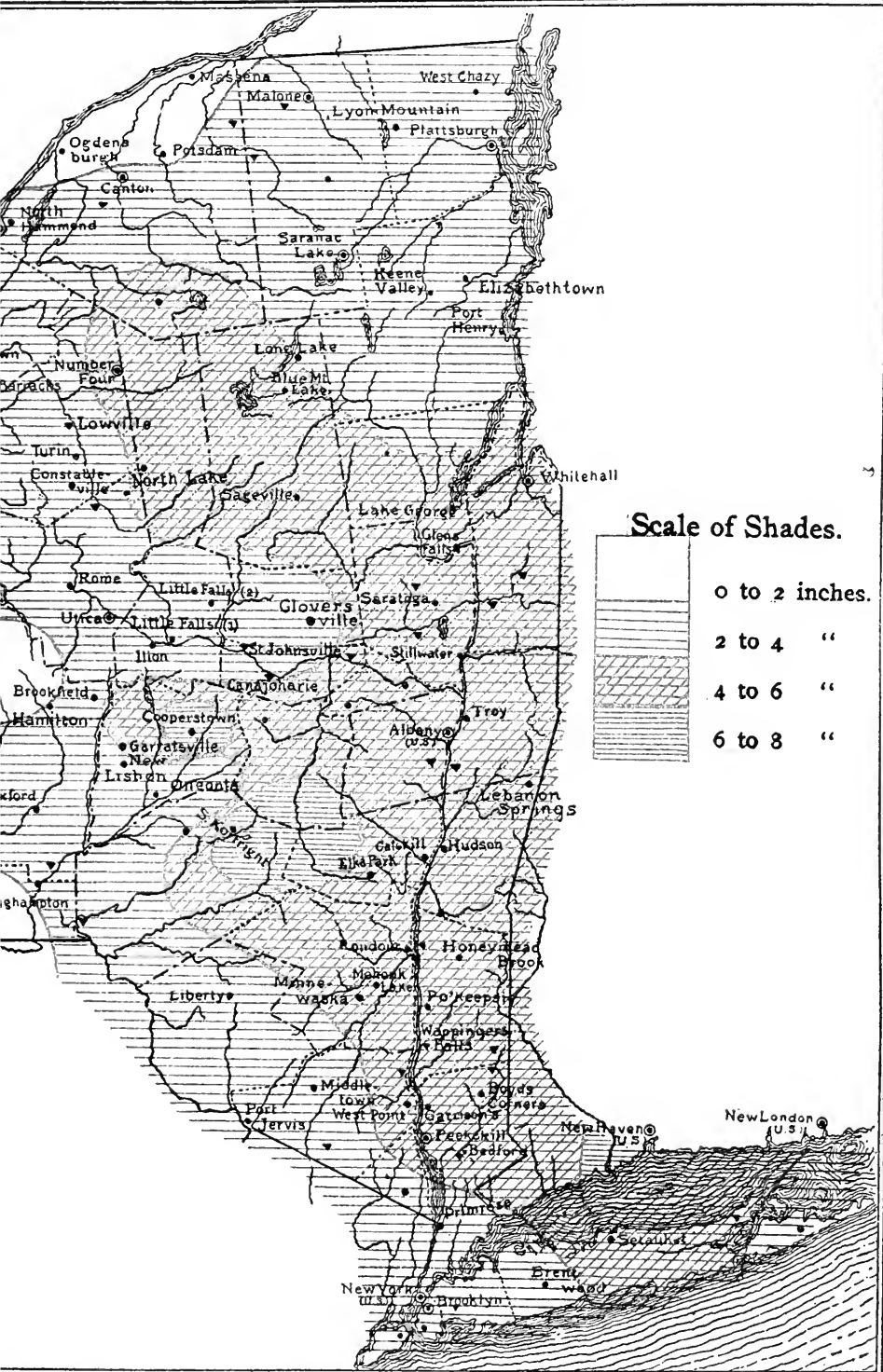
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR AUGUST, 1897.





Meteorological Summary for September, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for New York State was 30.15 inches. The highest barometer was 30.44 inches at Albany on the 4th, and at Buffalo and Erie on the 28th. The lowest pressure was 29.76 inches at Ithaca on the 26th. The average pressure over the State was exceptionally uniform. Excesses occurred in all sections, the average departure for 6 stations of the National Bureau being 0.08 inches.

The mean temperature for the State was 60.3 degrees as derived from observations of maxima and minima at 83 stations. The highest local mean was 66.6 degrees at Brooklyn, while the lowest was 55.1 degrees at North Lake. The highest general daily mean was 77 degrees on the 10th, the lowest being 47 degrees on the 28th. The maximum temperature reported was 97 degrees at Romulus on the 10th and at Wedgewood on the 16th; the minimum being 23 degrees at Franklinville on the 28th. The mean monthly range of temperature for the State was 56 degrees; the greatest local value being 68 degrees at Franklinville, and the least, 42 degrees at Setauket and Buffalo. The mean daily range was 23 degrees; greatest, 48 degrees, at Watkins on the 16th and at Waverly on the 30th. The mean temperatures of the various sections were as follows: The Western Plateau, 60.1 degrees; the Eastern Plateau, 59.3 degrees; the Northern Plateau, 56.3 degrees; the Atlantic Coast, 64.1 degrees; the Hudson Valley, 61.0 degrees; the Mohawk Valley, 59.2 degrees, the Champlain Valley, 58.6 degrees; the St. Lawrence Valley, 59.0 degrees; the Great Lakes, 62.3 degrees; the Central Lakes, 62.7 degrees. The average temperature at 25 stations possessing records for previous years was 0.1 degrees below the normal. Excesses were generally reported from western New York, and deficiencies from the eastern section.

The mean relative humidity for the State was 74 per cent. The mean dew-point was 52 degrees.

The average precipitation for the State was 1.98 inches of rain, as derived from the records of 108 stations. The greatest rainfall occurred southeast of the Central Lakes, with a maximum of 4.72 inches at Ithaca. In much of western, northern and southeastern New York the amount was under 2 inches, and in the vicinity of the St. Lawrence Valley and Great Lakes, less than one inch fell with a local minimum of 0.28 inches at Appleton. A list of the greatest rates of rainfall will be found in the table of the Meteorological Data. A trace of snow was recorded at Saranac Lake on the 27th. The rainfall for the State was 1.37 inches below the normal amount, as reported from 27 stations possessing records for previous years. Excesses obtained only at 4 stations, located in the central part of the State. The amounts were the least recorded in September at Humphrey, Buffalo, Rochester, Palermo and Erie.

The average number of days on which the precipitation amounted to 0.01 inches or more was 6.9; the rain frequency being greatest over the Northern and Eastern Plateaus, and the least near the Atlantic Coast, Great Lakes and in the St. Lawrence Valley. The number of clear days for the State were 16.0; of partly cloudy days, 8.1; and of cloudy days, 6.9; giving an average cloudiness of 39 per cent. The maximum cloudiness obtained over the St. Lawrence Valley, and the least near the Great Lakes, over the Eastern Plateau and Mohawk Valley.

The prevailing winds were from the southwest. The average total wind travel at 6 stations of the National Bureau was 6,505 miles, the values being greater than usual in eastern New York, and below the average along the lakes. The maximum velocity recorded at the above stations was 43 miles per hour at Buffalo on the 18th.

Electrical storms (including distant thunder or lightning) were reported as follows: On the 1st at 2 southwestern stations; on the 2d, 2 central and 4 southeastern stations; 5th and 6th, Waverly; 7th, 3 central and eastern stations; 11th, Cedar Hill; 13th, 9 western, central, northern and eastern stations; 15th, Jamestown; 16th, 4 western and 3 eastern-central stations; 20th, Bedford; 26th, Honeymead Brook and Poughkeepsie; 27th, 2 northern stations.

Light frosts occurred in a few of the higher valleys on the 2d, 3d, 4th, 26th and 27th. Killing frosts were reported from 5 stations

of the plateaus on the 18th, from 9 stations on the 21st and 22d, and quite generally through the central and northern sections on the 28th and 29th. Along the coast, lakes and in the larger valleys, no killing frosts occurred.

Hail fell on the 16th and 27th.

Lunar halos, or coronæ, were observed on the 4th and 7th.

GENERAL FEATURES OF THE WEATHER.

September was a pleasant month, with an unusually large percentage of sunshine and a light rainfall over the greater part of the State. The mean temperature for the State was very nearly normal, a general excess between the 4th and 16th being balanced by a nearly continuous deficiency during the remainder of the month. The first killing frosts of the season occurred at a few stations of the plateaus on the 18th and more generally on the 21st, 22d, 28th and 29th; but in many of the warmer localities none occurred during the month. A severe drouth was reported from many localities, and notably from western New York, where the rainfall had been light during the greater part of the summer. Thunder showers occurred on 11 days, but few severe local storms were noted.

Five areas of high and seven areas of low pressure (approximately) affected the weather conditions in this vicinity during September. Four depressions of moderate energy passed eastward over Canada or northern New York, the three remaining lows being confined mainly to the coast section. The most severe of these was the West India hurricane of the 23d to 24th, which, however, spent its force mainly over the ocean. The high pressure systems were more strongly developed than during several preceding months; and owing to their large extent and slow movement, dominated the weather conditions during the greater part of the month. The following is a brief account of the atmospheric movements:

Low I, 30.0 inches, passing off the coast on the 1st and 2d, and gave heavy showers in eastern and central New York and a light rainfall in the western section.

High I, 30.1 to 30.4 inches, shifted over the Eastern States and Provinces, with increasing intensity, from the 1st to the 7th, maintaining fine weather, with rising temperature after the 4th.

Slightly cooler weather, with light to moderate showers, occurred on the 7th, when the high was reinforced by a rise of pressure over Canada.

Low II, 29.8 inches, developed north and east of New York on the 9th, spreading over Canada on the 10th and 11th, giving scattering showers in the northern counties. High I on the central coast strengthened the southerly winds, bringing a hot wave of considerable intensity, especially in the western section, central on the 10th. The weather grew rapidly cooler with the advance of

High II, 30.3 inches, originating on the Pacific coast on the 8th, and passing along the northern border reached the Northeastern States on the 11th to 12th. The temperature fell to about the normal value.

Low III, 29.8 inches, originating on the northwestern coast, passed over Canada on the 13th, bringing light rains and thunder storms and rising temperature.

High III, 30.3 inches, passing over British America, was felt in this section on the 14th, 16th, bringing fair, cooler weather. The area passed to the coast and Southern States, while

Low IV, 29.8 inches, passed over the Upper Lakes and Canadian Provinces on the 16th and 17th, bringing very hot weather in the western and northern sections on the 16th, with light to moderate thunder showers in the interior of the State.

High IV, 30.4 inches, a very large area, was over the Western States on the 17th, and on the 18th extended to the Eastern-Central States, bringing severe frosts over half the continent. The highest wind velocity of the month marked the advance of this area.

Low V, 29.8 inches, originated in the northwest, reaching the St. Lawrence Valley on the 19th, thence probably passing over the State to the coast, giving a slight rise of temperature and moderate rains, with some heavy showers in the east.

High IV again spread over this section on the 21st and 22d, bringing clear weather and temperatures near the freezing point in the northern section.

Low VI, a tropical hurricane was central off the New Jersey and New England coast on the 23d and 24th. The rainfall was heavy at some eastern-central stations, but moderate elsewhere.

Cool winds from high IV, then situated north of New York, prevailed. The latter area, moving southward, gave warmer, fair weather on the 25th.

Low VII, 29.6 inches, passing over Canada on the 26th, raised the temperature above the normal and gave light general rains.

High V, 30.5 inches, moved eastward over Canada, reaching this vicinity on the 27th to 28th, bringing fair weather and the lowest temperature of the month, with killing frosts over the plateaus. Much warmer weather followed on the 30th, as the high moved southeastward.

NOTES FROM THE CROP BULLETIN: Bright weather early in the month was favorable for harvesting and other farm work, and the high temperature between the 5th and 12th was very favorable for ripening buckwheat and corn, which were in a backward condition at the opening of the month. The late second hay crop was harvested during the first week, and a fine crop of tobacco secured. Early grapes were also marketed in the southeast. The apple crop was poor, but other tree fruits yielded finely. The harvesting of large corn and buckwheat crops began before the middle of the month, and was general during the following week. In northern sections much corn was cut green, owing to danger from frosts. The yield of potatoes was uneven, the tubers rotting to a considerable extent. Some corn and buckwheat were damaged in the higher valleys by the frosts of the 21st and 22d. Owing to the severe drouth prevailing in the western counties much of the winter grain sown failed to germinate.

NOTES OF OBSERVERS AT THE FOLLOWING STATIONS: Humphrey, severe drouth, streams drying up, pastures dry and brown. South Canisteo, month ends dry and hot; farm work in satisfactory stage. Lake Placid, pleasantest month of the season. North Hammond, month closes fair and dry; ground dry and roads fine.

FOR SEPTEMBER, 1897.

TEMPERATURE—(IN DEGREES FAHR.).										SKY.		PRECIPITATION—(INCHES).						Prevailing direction of wind.		
Lowest.	Date.	Monthly range.		Mean daily range.		Greatest daily range.		Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.		Date.	Total snowfall.
25	28	59	27	46	30	2	20	16.9	8.7	4.4	6.0	1.91	1.48	.....	23	.....	.....	.....	.....	S. W.
31	h	58	27	41	15	10	24	14	9	7	8	2.88	1.48	.....	23	.....	.....	.....	.....	S. W.
29	28	62	28	42	30	6	19	14	9	7	6	1.74	0.71	5.00	24	.....	.....	.....	.....	S. W.
26	28	63	32	46	30	16	17	17	8	5	7	2.06	0.82	.....	24	.....	.....	.....	.....	S. W.
23	28	68	31	44	17	12	20	14	9	7	6	0.90	0.26	.....	13	.....	.....	.....	.....	N. W.
31	28	59	27	42	13	13	20	13	14	3	4	1.25	0.63	.....	23	.....	.....	.....	.....	S. W.
39	28	43	13	20	7	5	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. W.
32	h	56	24	33	25	8	14	15	15	0	4	0.75	0.36	6.30	2	.....	.....	.....	.....	S. W.
34	28	60	27	45	6	12	24	25	0	5	7	3.70	1.28	.....	24	.....	.....	.....	.....	N. W.
30	28	63	30	45	30	13	20	14	14	2	4	1.42	0.56	.....	13	.....	.....	.....	.....	W.
.....
35	28	53	21	30	8	2	20	20	5	5	3	0.99	0.66	2.30	13	.....	.....	.....	.....	W.
34	21	63	28	41	4	9	24	18	8	4	9	2.66	1.10	8.00	2	.....	.....	.....	.....	S. W.
32	28	59	27	43	16	11	ad	19	6	5	7	2.90	0.81	.....	2	.....	.....	.....	.....	N. W.
28	28	63	.....	.....	.....	.....	.....	19	4	7	8	3.47	1.39	22.00	23-24	.....	.....	.....	.....	W.
29	28	57	25	37	29	14	ae	16	11	3	8	1.13	0.34	.....	17	.....	.....	.....	.....	.....
25	28	58	26	48	30	3	12	17.3	8.4	4.3	9.1	3.27	1.60	.....	2	.....	.....	.....	.....	S. W.
39	28	61	21	45	16	9	20	13	14	3	9	3.57	1.13	.....	2	.....	.....	.....	.....	S. W.
33	28	59	31	47	16	7	24	17	9	4	9	3.03	1.15	.....	2	.....	.....	.....	.....	N. E.
27	28	63	30	44	16	16	24	18	8	4	7	3.13	0.95	.....	2	.....	.....	.....	.....	S. W.
32	28	60	28	40	7	11	23	22	5	3	8	3.13	0.56	.....	2	.....	.....	.....	.....	N. W.
25	28	61	29	43	16	14	22	.....	.....	.....	5	4.67	1.47	5.00	7	.....	.....	.....	.....	.....
33	18	53	24	43	22	12	ad	16	5	9	6	3.01	1.02	.....	20	.....	.....	.....	.....	N. W.
36	27	54	21	33	26	6	2	20	8	2	3	2.86	1.60	.....	2	.....	.....	.....	.....	.....
34	29	53	23	35	8	3	12	25	1	4	7	2.22	0.82	.....	2	.....	.....	.....	.....	N. W.
31	28	55	19	33	16	4	23	14	11	5	9	3.40	0.90	.....	20	.....	.....	.....	.....	N.
32	28	51	23	32	5	9	24	16	11	3	8	3.14	1.21	15.00	19-20	.....	.....	.....	.....	W.
26	28	62	28	43	16	10	24	16	8	6	8	3.19	0.88	.....	20	.....	.....	.....	.....	N. W.
29	28	61	28	42	16	11	24	.....	.....	.....	7	3.84	1.33	.....	1	.....	.....	.....	.....	.....
31	22	62	28	46	16	12	20	15	10	5	8	2.58	0.94	19.30	23-24	.....	.....	.....	.....	N. W.
33	j	59	27	42	6	4	28	15	10	5	6	4.01	1.09	.....	24	.....	.....	.....	.....	N.
31	64	32	48	30	9	24	18	10	2	9	9	3.42	0.84	.....	2	.....	.....	.....	.....	W.
29	28	62	26	42	16	11	24	17	7	6	9	4.45	1.08	.....	24	.....	.....	.....	.....	.....
39	28	47	15	22	28	4	20	.....	.....	.....	3	1.89	1.08	.....	2	.....	.....	.....	.....	W.
28	k	57	24	42	v	4	19	15.3	6.7	8.0	8.0	2.31	0.91	3.50	13	.....	.....	.....	.....	.....
33	21	52	19	41	12	4	19	.....	.....	.....	8	2.35	0.80	.....	11	.....	.....	.....	.....	.....
28	27	61	24	39	2	11	20	11	11	8	8	2.75	0.85	.....	11-20	.....	.....	.....	.....	N. W.
30	m	58	26	40	30	8	24	15	5	10	7	1.78	0.50	20.25	19-20	.....	.....	.....	.....	S. W.
28	22	57	27	40	12	17	af	20	4	6	9	1.85	0.89	15.00	19-20	.....	.....	.....	.....	W.
30	28	54	23	42	12	9	24	17	3	10	8	2.56	0.74	.....	20	.....	.....	.....	.....	N. E.
29	28	59	26	42	16	9	24	16	10	4	8	1.72	0.51	.....	7	.....	.....	.....	.....	W.
31	28	56	24	37	30	6	24	13	7	10	9	3.37	0.91	3.50	13	.....	.....	.....	.....	W.
31	28	52	20	39	6	4	22	17.0	7.7	5.3	5.6	1.90	1.67	4.45	2	.....	.....	.....	.....	.....
41	28	46	17	28	30	4	22	16	8	6	4	1.90	1.17	.....	23	.....	.....	.....	.....	W.
41	28	47	15	26	6	8	23	19	6	5	6	1.64	0.84	.....	24	.....	.....	.....	.....	S. W.
42	28	54	21	27	27	10	12	.....	.....	.....	6	1.67	0.80	.....	1	.....	.....	.....	.....	N. E.
35	29	58	26	39	6	10	24	19	4	7	5	2.30	1.00	6.00	2	.....	.....	.....	.....	N. W.
46	28	42	15	23	5	6	24	17	8	5	6	1.20	0.67	6.00	2	.....	.....	.....	.....	W.
31	28	58	22	34	30	8	23	18	6	6	8	2.77	1.00	0.50	2	.....	.....	.....	.....	W.
37	29	56	25	38	30	12	24	13	14	3	4	1.84	1.32	.....	2	.....	.....	.....	.....	.....

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Mean of tri-daily observations	Mean of maximum and minimum.	Highest.	Date.
<i>Hudson Valley</i>													
Albany.....	Albany.....	97	30.16	30.44	4	29.79	17	0.65	77	52	61.0	95	d
Cedar Hill.....	".....										63.0	94	10
Honeymead Brook.....	Dutchess.....	450								59.2	59.2	87	11
Poughkeepsie.....	".....	189									61.4	93	10
Wappinger's Falls.....	Dutchess.....	110											
Catskill.....	Greene.....	450									62.2	90	10
West Point.....	Orange.....	167									60.6	95	11
Carmel.....	Washington.....	500									61.8	92	10
Greenwich.....	Putnam.....										59.0	88	10
<i>Mohawk Valley</i>													
Little Falls (1a).....	Herkimer.....	324									59.2	87	10
Canaoharie.....	Montgomery.....	300								61.6	58.7	84	9
St. Johnsville.....	".....	810									61.7	87	10
Rome.....	Oneida.....	415									58.8	85	10
<i>Champlain Valley</i>													
Plattsburgh Bar'cks.....	Clinton.....	125									58.6	95	11
Ticonderoga.....	Essex.....										57.9	95	11
Glens Falls.....	Warren.....	340								58.0	59.4	93	10
Lake George.....	".....	350							78	52	58.3	58.2	91
<i>St. Lawrence Valley</i>													
Alexandria Bay.....	Jefferson.....										59.0	90	10
Madison Barracks.....	".....	266									57.8	86	g
Watertown.....	".....	486											
Canton.....	St. Lawrence.....	304								58.8	57.2	89	9
North Hammond.....	".....	300								59.7	60.4	90	10
Ogdensburg.....	".....	258									60.5	87	10
Potsdam.....	".....	300											
<i>Great Lakes</i>													
Westfield.....	Chautauqua.....	758									62.3	95	10
Buffalo.....	Erie.....	768	30.16	30.44	28	29.81	19	0.63	66	51	62.3	87	10
Pittsford.....	Monroe.....	502									63.0	84	9
Rochester.....	".....	523	30.15	30.43	28	29.81	19	0.62	68	50	61.4	94	10
Appleton.....	Niagara.....	301									61.6	91	10
Fort Niagara.....	".....	263									65.2	95	10
Baldwinsville.....	Onondaga.....	390								60.8	61.6	91	10
Ridgeway.....	Orleans.....										63.2	91	10
Oswego.....	Oswego.....	335	30.14	30.40	28	29.78	19	0.62	70	50	61.0	88	16
Palermo.....	Oswego.....	460									59.2	59.3	91
Lyons.....	Wayne.....	407									62.0	61.2	94
Erie, Pa.....	Erie.....	714	30.17	30.44	28	29.85	19	0.59	66	51	64.0	88	9
<i>Central Lakes</i>													
Auburn.....	Cayuga.....										62.7	97	10
Fleming.....	".....	1000									62.0	95	10
Watkins.....	Schuyler.....								73	57	63.2	92	10
Romulus.....	Seneca.....	719									63.3	96	c
Ithaca.....	Tompkins.....	810	30.15	30.42	28	29.76	26	0.66	71	52	60.0	63.2	97
Penn Yanu.....	Yates.....										61.7	93	10
Mean.....			30.15	30.44	a	29.76	26	0.62	74	52	60.3	97	c

*Mean of the tri-daily observations. †Mean of the Max. and Min. by the Draper Thermog observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4. ‡ Blank in (1) Voluntary Observer. (2) U. S. Weather Bureau. (1a) City Reservoir; (2a) Intake Conduit (a) 4, 28; (b) 9, 10, 16; (c) 10, 16; (d) 10, 11; (e) 10, 11, 12; (f) 9, 10; (g) 7, 17; (h) 21, 28; (j) 28, 29; (u) 16, 29; (v) 12, 16; (w) 12, 30; (x) 16, 30; (y) 5, 28; (z) 4, 15; (aa) 3, 17, 19; (ab) 16, 28, 29, 30; (ac)

FOR SEPTEMBER, 1897.

TEMPERATURE — (IN DEGREES FAHR.)							SKY.		PRECIPITATION — (INCHES.)					Prevailing direction of wind.			
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.	
30	28	27	29	42	16	6	ad	16.7	7.4	5.9	7.12	2.21	1.80	<i>h. m.</i>	27	.....	.....
32	22	56	62	33	6	7	ad	16	9	5	5	1.87	0.82	.....	20	.....	S.
33	22	62	62	33	6	7	ad	19	7	4	10	2.15	0.78	.....	20	.....	S.
35	29	52	20	41	2	6	ad	15	7	8	9	1.62	1.00	1.00	2	.....	S. W.
31	28	62	22	42	30	7	ad	16	10	4	6	1.83	0.84	5.00	2	.....	N.
37	22	53	29	30	30	6	21	14	9	7	7	3.39	1.05	.....	2	.....	N.
30	24	65	29	42	12	14	15	.....	.....	.....	6	2.90	1.00	.....	2	.....	.....
32	28	60	23	36	30	7	23	22	1	4	7	1.71	0.78	7.06	2	.....	.....
30	28	55	22	31	y	10	21	15	9	6	6	1.55	0.54	2.00	13	.....	W.
30	27	52	22	38	26	4	24	23.0	2.0	5.0	6.8	2.00	0.77	.....	19	.....	W.
30	27	54	22	35	26	9	23	22	1	7	6	1.90	0.75	13.00	19-20	.....	E. & W.
37	22	50	29	32	29	5	24	26	0	4	6	1.98	0.72	.....	20	.....	W.
33	22	52	21	32	16	4	24	21	5	4	7	1.80	0.62	.....	20	.....	.....
30	27	52	23	38	26	13	12	.....	.....	.....	8	2.30	0.77	.....	19	.....	.....
30	28	58	22	37	30	5	24	14.0	8.3	7.7	7.2	1.41	0.75	6.30	21	.....	.....
38	29	51	20	31	7	6	h	.....	.....	.....	9	1.90	0.75	6.30	21	.....	W.
33	28	60	22	33	5	8	24	14	9	7	6	1.32	0.63	.....	20	.....	N. & S.
30	28	61	24	37	30	6	24	12	9	9	6	1.19	0.60	.....	19-20	.....	S. W.
36	m	52	21	30	6	5	21	16	7	7	8	1.23	0.52	20.00	20	.....	S.
25	28	57	24	36	z	8	ag	6.7	15.3	8.0	5.2	1.07	0.81	.....	11	.....	.....
33	18	53	26	33	aa	14	9	.....	.....	.....	5	0.79	0.30	1.00	13	.....	S. E.
25	28	64	25	36	4	8	19	7	16	7	3	1.24	0.81	.....	11	.....	S. W.
34	h	56	22	36	15	8	ah	5	8	17	7	1.70	0.63	.....	11	.....	N.
23	28	51	21	32	12	11	24	8	22	0	6	0.56	0.15	7.00	26	.....	S. W.
32	n	54	20	38	16	5	9	17.0	8.4	4.6	6.1	0.71	0.54	.....	23	.....	.....
37	28	50	20	32	14	5	19	23	7	0	3	0.58	0.32	.....	16	.....	S. W.
42	21	42	15	27	15	6	10	13	13	4	5	0.31	0.16	.....	13	.....	S. W.
32	28	62	25	38	16	11	am	13	13	4	8	0.98	0.52	.....	20	.....	S. W.
36	28	58	21	31	5	9	20	14	7	9	7	0.46	0.14	.....	20	.....	S. W.
35	28	56	22	34	29	8	20	16	7	7	5	0.28	0.15	.....	1	.....	S. W.
38	p	57	22	30	ab	10	20	.....	.....	.....	4	1.00	0.43	5.00	13	.....	N.
36	28	55	23	38	16	10	an	20	5	5	6	1.20	0.54	.....	23	.....	.....
35	28	56	22	34	15	9	19	14	15	1	8	0.47	0.14	.....	17	.....	S. W.
43	18	45	17	33	16	7	19	16	4	10	9	0.81	0.33	.....	24	.....	S.
32	18	59	22	38	16	8	19	22	4	4	8	0.69	0.28	17.20	23-24	.....	S. W.
38	28	56	19	35	16	8	19	16	10	4	7	1.18	0.34	.....	24	.....	N. W.
40	28	48	16	24	9	6	20	20	7	3	4	0.54	0.30	.....	1	.....	S.
32	28	59	24	48	16	8	20	16.2	8.3	5.5	7.8	3.34	2.45	21.30	23-24	.....	.....
32	28	63	26	37	16	9	24	20	7	3	9	3.29	1.82	14.00	23-24	.....	N.
37	28	55	21	32	30	7	24	13	15	2	4	3.46	2.00	16.00	23-24	.....	W.
36	j	60	27	48	16	10	20	16	8	6	9	2.75	0.91	20.00	23-24	.....	N.
37	28	60	21	34	ac	10	24	19	5	6	7	3.95	1.88	22.15	23-24	.....	W.
36	28	57	24	37	16	08	20	16	11	3	10	4.72	2.45	21.30	23-24	.....	S. E.
36	28	59	24	40	16	11	ap	13	4	13	8	1.90	0.86	.....	24	.....	S. W.
23	28	56	23	48	x	2	20	16.0	8.1	5.9	6.9	2.01	2.45	21.30	23-24	T.	S. W.

raph. Report received too late to be used in computing means. The means from the tri-daily diates that the duration is not shown in the original records, but is within twenty-four hours. nine miles north of city.

(k) 22, 27, 28; (m) 22, 28; (n) 18, 28; (p) 21, 27; (q) 15, 30; (r) 15, 17, 29; (s) 12, 18; (t) 5, 6, 16, 30; 6, 7; (ad) 20, 24; (ae) 13, 21; (af) 8, 25; (ag) 19, 24, 26; (ah) 24, 26; (am) 19, 20; (an) 19, 24; (ap) 20, 23.

TEMPERATURE—SEPTEMBER, 1897, SHOWING DAILY MEANS
STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	64	63	57	59	65	68	70	69	71	75	68	66	72	62
<i>Altied</i>	71	71	71	77	84	87	84	80	89	90	82	78	80	72
	54	48	40	39	52	50	54	58	55	63	59	52	64	48
<i>Angelica</i>	74	72	68	75	81	84	83	79	87	88	80	79	90	73
	55	58	40	35	41	43	54	58	50	56	51	53	70	50
<i>Bohvar</i>	73	73	68	75	81	83	83	82	85	88	82	80	83	73
	53	55	39	35	40	43	50	53	46	53	47	55	58	51
<i>Franklinville</i>	72	73	70	79	84	86	86	83	89	91	80	81	80	74
	54	57	36	36	42	43	51	52	48	50	51	54	62	45
<i>Humphrey</i>	70	76	74	78	80	86	85	80	88	90	81	78	80	79
	50	54	46	43	47	51	52	57	54	62	58	52	54	51
<i>Arkwright</i>														
<i>Jamestown</i>	72	71	70	75	81	82	83	81	85	86	79	79	83	74
	57	58	46	45	49	50	58	56	53	61	59	60	67	56
<i>Elmira</i>	79	75	73	80	87	94	83	84	83	93	83	76	83	75
	55	57	43	47	50	49	59	59	59	60	59	58	57	57
<i>Avon</i>	72	74	70	78	85	88	84	83	91	93	78	83	79	73
	40	42	43	38	45	51	56	56	55	55	59	41	62	58
<i>Lockport</i>	78	70	69	74	79	83	81	81	86	88	70	80	76	67
	57	54	49	45	52	58	59	58	59	66	55	50	65	51
<i>Wedgewood</i>	80	75	76	84	92	94	88	87	94	96	89	76	80	75
	56	54	44	43	54	57	63	64	61	68	60	50	60	48
<i>Addison</i>	78	72	69	73	81	86	83	81	89	91	85	75	81	73
	54	54	45	40	45	47	57	59	52	56	53	55	60	51
<i>South Canisteo</i>														
<i>Arcade</i>	76	69	63	73	79	81	82	79	81	86	77	79	78	68
	53	51	46	42	48	51	56	54	54	63	59	53	64	50
<i>Eastern Plateau...</i>	61	63	57	58	64	68	69	70	71	74	71	59	68	60
<i>Binghamton (1)</i>	79	75	72	75	77	85	83	84	88	91	86	70	82	74
	52	57	45	44	46	52	58	62	53	59	56	48	62	52
<i>Binghamton (2)</i>	80	72	69	75	83	87	82	85	89	92	86	68	81	69
	55	55	47	44	48	52	50	62	55	60	61	49	63	50
<i>Oxford</i>	78	75	69	75	82	87	83	86	87	90	84	72	77	73
	50	53	42	38	42	47	54	57	51	55	57	43	58	45
<i>Cortland</i>	73	72	70	75	85	86	81	85	90	91	82	70	71	72
	52	48	42	39	45	46	55	61	53	54	58	45	59	49
<i>South Kortright...</i>	76	72	66	72	78	83	80	80	84	86	82	70	71	70
	45	53	40	35	43	44	51	56	52	54	51	41	55	45
<i>Bouckville</i>	74	70	65	70	78	80	75	80	83	86	78	70	75	71
	49	52	42	42	47	48	57	59	53	53	59	44	58	45
<i>Middletown</i>	79	70	69	71	75	85	82	76	86	90	88	68	78	74
	50	64	50	45	56	60	62	60	61	68	62	50	60	60
<i>Port Jervis</i>	78	70	70	72	80	83	81	83	84	87	87	67	79	76
	51	50	50	44	50	53	60	60	61	60	61	64	51	62
<i>Cooperstown</i>	74	70	64	68	78	80	70	75	83	86	79	68	73	62
	52	57	50	43	49	55	62	58	58	62	61	49	58	48
<i>Garrattsville</i>	73	71	64	70	78	81	73	77	84	86	80	70	72	66
	52	45	44	41	46	57	58	59	53	59	50	46	59	49
<i>New Lisbon</i>	76	72	67	71	80	84	76	76	85	88	82	70	73	67
	49	53	39	36	41	45	53	56	52	55	56	41	58	43
<i>Oneonta</i>	75	75	72	76	85	86	78	82	87	90	83	72	77	71
	51	55	44	40	45	49	56	59	55	57	59	45	60	48
<i>Perry City</i>	77	72	68	73	82	84	81	84	88	93	82	75	78	73
	52	54	41	37	48	48	54	54	52	60	57	44	60	46
<i>Straits Corners</i>	80	72	72	74	82	87	84	88	88	90	92	72	83	71
	57	53	44	39	55	45	56	54	52	57	56	49	59	46
<i>Waverly</i>	82	77	77	80	88	91	89	90	93	95	92	72	84	77
	54	60	43	41	45	49	59	54	51	56	54	57	61	50
<i>Dryden</i>	77	71	67	75	81	84	83	82	88	91	81	72	80	66
	52	49	39	38	45	47	57	60	54	60	58	47	60	44
<i>Mohawk Lake</i>	75	70	67	68	82	81	75	73	82	86	85	66	75	71
	57	56	52	50	63	65	64	61	66	73	72	54	58	56

FOR THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
61	71	62	52	58	48	46	51	51	54	57	61	49	46	54	62	60.1
81	89	70	65	64	50	58	68	68	57	56	73	76	54	61	74	82
40	53	46	36	50	38	32	35	40	46	46	48	36	32	35	47	59.7
77	88	78	65	62	59	57	66	59	62	69	71	65	60	72	80	59.3
41	50	55	34	56	41	30	30	40	48	35	47	38	28	32	38	
78	89	62	63	64	54	59	67	60	62	71	77	61	63	73	80	57.4
38	47	46	33	38	39	28	28	39	43	34	36	34	26	28	34	
84	90	74	66	64	53	60	64	61	64	74	76	59	64	72	82	59.0
40	52	52	33	44	41	31	31	36	42	42	40	46	24	29	38	
83	88	85	65	61	51	60	68	61	74	74	76	57	68	76	80	60.6
48	62	43	33	44	38	34	36	43	43	40	49	40	31	37	45	
80	88	69	66	60	55	59	65	60	65	72	75	58	62	73	76	61.1
47	59	53	38	51	44	32	36	45	49	39	48	42	32	36	44	60.9
76	85	76	72	72	75	62	67	60	61	74	80	60	63	72	82	62.7
44	49	54	41	58	45	40	34	44	49	40	50	43	37	36	43	
75	93	74	74	68	67	58	67	62	69	75	78	58	62	74	85	60.2
39	40	58	37	53	44	35	36	49	40	39	48	40	30	36	40	
74	88	64	70	64	48	59	70	67	67	73	74	54	57	71	78	61.3
48	60	48	40	54	46	38	45	45	50	48	50	40	35	42	52	
80	97	75	71	74	52	66	70	60	57	83	79	59	65	76	90	63.8
43	57	50	39	51	40	34	87	46	48	44	51	39	36	39	52	
75	91	74	68	74	54	60	65	55	60	72	77	58	61	73	82	60.0
44	48	52	38	42	43	34	34	42	49	39	41	40	32	33	40	
77	86	73	65	63	54	55	66	60	62	71	74	53	58	73	76	56.2
44	57	44	35	50	39	31	37	43	46	41	48	37	29	36	45	59.2
57	66	61	53	59	49	48	49	50	54	56	60	50	46	51	59	59.3
72	90	70	70	77	53	55	66	55	59	72	78	56	57	70	80	60.1
44	45	48	38	50	44	39	33	44	49	42	43	39	30	33	40	
70	92	71	68	75	52	56	65	53	58	74	80	54	58	72	80	60.0
44	45	45	40	52	42	38	33	45	51	43	44	42	34	34	40	
72	85	70	67	75	60	57	66	62	62	73	74	62	58	70	75	
39	41	51	33	40	41	33	29	39	46	38	38	40	27	30	40	58.4
75	86	69	69	70	57	56	66	55	60	74	77	55	58	71	81	
39	46	53	34	47	46	37	34	44	47	39	47	39	32	35	41	59.2
70	83	75	74	72	58	53	62	57	65	64	75	56	56	61	74	
35	40	52	33	40	40	33	28	38	46	38	40	38	25	28	32	56.3
68	84	67	64	72	58	54	78	60	58	69	74	60	62	65	73	58.4
40	49	46	33	47	46	37	35	43	46	40	47	37	49	37	42	
75	78	79	72	64	52	58	60	55	62	72	76	61	65	68	75	61.6
48	50	64	49	45	42	39	38	45	50	48	43	36	45	42	45	
71	80	76	78	74	68	59	61	65	62	71	75	59	71	69	75	
60	45	47	68	41	42	54	40	36	45	52	50	45	48	34	42	62.2
68	78	63	61	71	55	51	61	52	56	62	72	52	52	60	71	
43	45	50	37	47	45	38	32	48	51	44	46	37	31	37	46	57.5
67	70	71	61	73	53	58	61	55	58	68	72	55	54	60	74	
40	45	44	33	46	42	38	33	43	49	38	43	36	32	34	41	56.8
70	83	69	62	74	54	54	65	55	59	70	74	54	56	57	76	56.0
36	40	41	32	38	41	36	28	38	49	39	37	36	26	30	34	
74	85	73	67	75	58	59	68	60	61	74	76	57	59	68	77	59.4
41	43	50	36	45	44	39	31	43	50	40	42	40	29	34	37	
71	92	72	66	71	52	55	64	60	59	71	76	56	56	71	80	
35	46	48	33	47	40	36	31	40	46	40	42	38	33	33	43	58.6
80	90	75	68	75	54	71	75	75	61	73	79	58	37	69	80	
50	71	54	36	42	43	55	53	52	39	38	40	42	33	33	40	61.4
78	95	74	72	76	56	64	70	56	59	77	82	61	66	77	86	61.9
41	44	47	37	43	44	37	33	42	50	37	39	45	31	31	38	
72	90	70	65	75	53	53	65	57	57	70	77	54	55	68	78	58.6
36	48	50	36	52	41	36	36	44	46	38	47	37	29	33	42	
62	75	75	63	70	52	58	58	53	59	70	74	59	61	64	72	62.0
48	55	68	44	53	48	42	41	46	50	53	59	44	39	44	55	

TEMPERATURE—SEPTEMBER, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau</i> ..	59	61	55	56	61	67	65	66	69	73	66	58	62	55
Saranac Lake.....	72	75	67	71	82	83	66	82	88	89	64	72	72	57
Lake Placid	49	53	50	54	59	60	61	60	60	52	56	39	53	37
Gloversville	69	66	67	66	69	80	74	78	79	85	84	80	68	60
.....	49	53	50	54	59	60	61	60	60	52	56	39	53	39
.....	77	77	70	73	80	84	71	78	87	88	80	69	75	72
.....	50	55	45	39	44	55	56	56	55	63	54	41	60	45
.....	70	73	74	70	71	76	81	70	77	83	85	76	70	75
Little Falls (2a)....	44	49	39	38	39	48	56	53	54	58	63	36	49	47
.....	66	71	70	64	71	77	80	69	74	84	84	63	71	71
North Lake.....	47	54	41	41	44	50	55	50	55	57	58	42	49	47
.....	72	71	66	75	80	85	73	89	86	88	78	72	77	69
Lowville.....	52	54	38	35	42	55	54	54	57	70	56	37	59	45
.....	68	70	66	69	72	81	98	77	83	84	73	68	72	63
Number Four.....	44	53	38	41	43	49	54	60	55	56	49	40	50	42
<i>Atlantic Coast</i> ..	68	68	64	62	67	72	71	70	76	78	79	65	71	68
.....	80	75	72	72	79	85	79	79	85	88	90	80	80	77
Brooklyn	61	66	59	55	58	62	66	65	66	69	73	55	61	66
.....	78	74	71	73	78	88	78	76	88	91	90	69	81	76
New York city	62	55	61	58	59	62	67	66	66	71	69	59	64	62
.....	80	75	75	74	84	90	80	77	92	96	94	70	81	76
Wiltons Point.....	62	60	56	54	57	63	63	65	65	68	67	60	66	55
<i>Brentwood</i>.....	.....	82	75	72	76	87	80	.....	89	93	91	80	75	76
.....	.....	60	50	48	48	48	62	.....	66	61	64	57	63	53
Setauket.....	78	69	69	70	78	82	73	74	84	88	87	69	77	74
.....	58	62	59	53	55	61	64	62	68	68	68	60	62	65
Bedford	77	72	70	70	80	84	77	75	85	89	88	69	75	74
.....	50	60	54	46	50	53	62	60	65	62	66	52	60	58
.....	82	74	72	78	82	88	79	78	89	93	92	72	80	78
Prattose	52	62	50	47	50	51	60	59	61	62	65	52	61	56
<i>Hudson Valley</i>	65	66	61	57	65	69	71	68	73	77	74	61	67	64
.....	79	77	69	73	81	89	74	76	90	94	86	71	76	71
Albany	57	59	53	48	56	56	62	63	64	68	55	48	62	53
.....	75	70	66	67	76	80	79	75	81	86	87	68	75	68
Honeymead Brook.	51	59	49	44	50	52	63	59	58	61	64	45	60	57
.....	80	74	69	73	84	87	82	78	89	93	92	72	78	76
Poughkeepsie	50	59	48	43	51	52	61	60	61	60	63	45	62	55
<i>Catskill</i>	78	74	70	72	80	84	76	74	85	90	87	70	78	74
.....	52	60	52	47	51	55	64	62	64	66	60	48	62	59
West Point.....	79	81	81	72	75	80	89	82	77	90	95	94	72	79
.....	59	52	55	40	40	50	57	52	55	65	62	52	46	54
Carmel	78	70	70	71	83	84	83	78	86	92	89	75	80	72
.....	51	50	49	45	55	58	68	60	64	60	56	53	56	56
Greenwich.....	74	73	69	67	79	82	76	74	84	88	76	69	72	71
.....	52	58	53	42	48	52	57	60	60	63	54	39	61	50
<i>Mohawk Valley</i>	65	63	59	60	65	68	66	68	72	73	67	62	66	59
.....	75	74	71	74	79	82	70	81	84	82	77	69	76	66
Little Falls (1a) ...	56	45	44	51	56	61	57	59	67	65	46	54	49	42
.....	75	76	72	73	80	79	75	80	85	87	79	72	77	73
Cauajoharie	57	61	51	48	52	56	64	62	60	63	65	57	65	57
.....	74	74	69	71	78	81	74	77	82	85	81	69	76	72
St. Johnsville.....	51	57	46	42	48	58	60	55	57	63	63	48	62	51
.....	75	74	76	75	75	77	73	77	82	82	76	70	75	68
Rome	54	44	44	40	50	53	56	55	58	60	48	57	43	41
<i>Champlain Valley</i> ..	64	65	59	55	61	67	65	65	72	79	68	55	61	62
.....	74	75	73	64	68	80	84	67	76	92	95	68	68	73
Plattsburgh Barracks	53	55	50	41	41	54	53	53	60	67	68	42	44	54
.....	75	72	67	67	80	82	77	73	86	93	81	69	75	72
Ticonderoga	52	59	50	43	47	57	57	57	60	68	56	43	46	50
.....	76	78	70	69	78	84	70	78	87	91	72	67	67	70
Glens Falls	51	55	44	40	44	50	56	58	62	72	48	42	60	51
.....	74	74	69	70	78	81	68	74	84	88	73	70	71	70
Lake George	53	52	50	44	49	51	58	58	59	62	52	46	60	52

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
53	61	59	47	51	50	42	47	52	55	55	54	47	42	48	54	56.3
77	83	59	57	59	46	53	57	70	58	74	69	43	52	62	76	55.6
42	56	33	39	44	35	33	37	45	39	44	37	28	37	38	49	
65	72	72	53	52	55	47	65	69	68	67	63	59	62	52	52	57.5
40	45	46	35	48	40	33	46	51	49	43	44	38	39	46	46	
70	78	72	62	75	56	55	64	58	59	72	75	57	59	68	75	58.2
39	43	49	34	41	47	38	30	41	51	46	41	37	30	40	35	
65	69	78	68	62	73	53	52	61	76	61	68	72	48	55	63	55.5
35	40	42	30	32	48	35	28	36	43	44	38	38	30	32	34	
60	71	82	61	55	64	46	50	64	59	57	69	69	44	50	64	55.1
29	42	51	34	40	45	34	33	39	50	41	42	37	30	31	36	
70	86	73	62	56	58	53	66	65	59	73	70	58	54	67	77	57.5
35	44	51	31	44	41	32	32	35	50	47	42	36	29	35	39	
68	80	67	57	55	51	49	64	62	55	69	65	53	51	63	73	54.5
38	44	46	30	46	40	31	32	40	49	37	37	35	28	30	36	
61	66	68	57	61	59	53	54	55	59	63	65	57	52	56	61	64.1
72	77	80	70	76	64	66	63	59	66	77	80	67	66	72	78	
55	56	63	52	56	59	46	59	53	54	55	57	55	44	48	50	66.6
73	79	77	67	70	65	60	59	58	64	74	76	62	62	70	76	
56	59	55	50	57	48	45	50	50	54	55	59	48	44	50	55	65.0
74	81	80	71	74	65	62	63	64	68	80	79	80	65	71	78	
52	57	49	51	59	45	47	52	51	50	51	56	43	42	47	51	66.1
73	78	78	67	71	74	61	62	61	64	74	75	63	64	70	75	61.6
45	45	43	40	38	51	38	36	50	54	46	45	45	37	35	40	
68	77	77	64	72	70	61	61	60	63	71	75	66	62	66	69	64.8
56	56	63	53	52	54	48	52	52	57	56	55	51	46	50	50	
71	78	78	65	71	62	60	59	55	62	73	76	64	63	67	75	61.3
44	45	61	39	47	50	42	38	47	55	48	47	46	31	35	41	
72	81	80	70	75	68	67	60	61	67	77	79	63	66	71	78	63.3
45	49	66	40	45	54	41	39	48	54	48	45	49	38	37	40	
59	61	65	53	60	55	50	50	54	56	59	63	53	48	51	57	61.0
71	78	77	66	75	58	59	66	64	62	76	79	59	61	71	74	63.0
48	48	50	45	54	48	43	38	50	55	54	54	43	39	42	42	
66	76	75	60	71	54	56	59	59	68	74	57	60	64	71	59.2	
45	45	54	39	46	48	39	37	46	53	45	46	38	38	35	40	
70	81	79	67	75	63	62	64	57	60	76	80	65	65	68	79	
45	44	53	37	44	48	41	36	49	53	43	44	40	31	32	37	61.4
74	74	76	66	74	59	61	64	61	59	71	76	60	62	68	73	62.2
48	51	55	44	51	49	44	37	49	53	51	51	46	39	42	43	
72	70	80	74	70	74	60	62	64	66	62	79	79	60	62	70	60.6
58	44	50	39	38	45	35	34	37	38	40	44	46	30	34	35	
70	81	77	67	73	60	59	62	57	62	74	80	61	63	65	78	61.8
48	47	57	39	45	48	39	40	50	52	50	51	46	32	37	42	
67	75	71	59	74	66	58	61	63	62	70	73	63	61	61	70	
41	45	58	35	47	47	40	35	44	52	45	48	44	30	35	40	59.0
58	65	56	53	60	49	45	50	52	54	58	59	47	46	53	57	59.2
72	77	66	65	74	50	53	60	55	58	71	75	49	57	70	72	58.7
50	55	35	41	47	35	35	42	46	48	49	40	30	36	42	54	
70	76	70	65	75	62	53	63	58	60	71	75	62	60	73	70	61.7
48	51	53	42	49	50	42	39	48	55	47	48	48	37	41	40	
70	77	63	63	73	59	54	60	55	58	68	72	59	56	62	69	58.8
42	45	51	37	49	46	38	33	45	54	46	45	41	34	37	41	
65	78	65	66	72	52	52	61	62	60	65	76	56	52	60	65	57.4
47	57	38	47	44	35	35	43	48	43	45	38	30	35	40	45	
55	59	61	50	56	53	50	49	53	56	58	61	51	48	50	53	58.6
62	68	72	67	58	61	48	58	60	65	61	71	65	49	58	57	57.9
42	47	48	40	39	47	42	39	39	44	52	50	43	43	38	42	
67	72	71	58	72	64	59	63	65	60	73	71	62	62	60	70	59.4
42	48	57	40	44	48	45	35	43	52	46	53	46	33	36	39	
68	74	74	61	73	54	62	62	63	59	74	72	54	64	65	73	58.2
40	44	48	36	42	46	40	33	43	53	43	47	41	30	36	36	
70	74	72	60	73	59	62	63	63	59	71	71	57	63	63	69	
47	47	47	39	48	48	42	36	45	54	46	50	40	36	40	40	59.0

TEMPERATURE—SEPTEMBER, 1897, SHOWING DAILY MEANS FOR
STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Valley</i>	63	63	58	58	64	71	66	67	72	76	67	59	65	60
Madison Barracks.	74	76	75	70	76	78	86	69	71	83	85	69	77	77
	53	56	42	42	44	54	55	52	57	63	65	39	48	45
Canton	75	73	67	76	81	86	68	84	89	.....	72	73	78	67
	46	48	41	40	49	60	55	55	62	67	48	40	55	46
North Hammond ..	70	76	76	74	78	84	74	80	86	90	88	76	68	70
	50	54	44	42	50	64	56	59	62	68	52	42	56	50
Ogdensburg	75	70	72	74	80	82	74	78	85	87	72	82	78	70
	63	54	47	45	51	62	56	58	63	67	56	49	50	54
<i>Great Lakes</i>	66	64	59	60	67	71	69	71	75	80	67	63	72	62
Westfield	79	70	68	71	78	80	78	82	85	87	79	75	82	85
	56	56	48	49	54	59	62	56	61	69	60	60	70	53
Buffalo	73	72	70	73	76	76	81	79	84	80	75	73	74	71
	60	57	51	51	61	66	66	63	68	74	58	56	65	56
Pittsford	74	70	67	75	83	84	81	81	90	94	74	80	81	66
	55	54	45	40	51	57	51	55	60	70	55	44	63	48
Rochester	72	71	67	75	85	85	84	83	91	94	74	79	81	66
	58	57	53	45	54	59	63	60	63	70	58	55	64	54
Appleton	75	69	65	68	80	80	75	82	90	91	71	70	79	69
	55	54	49	43	50	58	61	61	60	68	57	48	61	50
Fort Niagara	73	73	71	73	84	86	78	88	90	95	79	72	80	72
	60	56	54	45	55	63	62	68	65	69	63	52	62	56
Baldwinsville	75	74	69	78	85	85	75	82	89	91	77	75	81	69
	52	56	47	46	52	60	62	59	59	67	55	48	60	51
Ridgeway	73	71	67	73	81	87	80	82	89	91	76	76	80	76
	58	55	51	44	54	61	60	59	65	72	58	50	64	57
Oswego	71	70	65	68	79	77	72	70	84	87	73	75	77	64
	57	58	53	47	54	60	58	61	61	69	57	48	63	53
Palermo	72	72	67	76	83	78	70	74	86	91	76	76	78	69
	55	56	39	40	47	53	57	59	57	63	63	40	60	50
Lyons	75	70	67	75	84	85	78	82	91	94	79	77	80	67
	59	58	53	45	51	57	62	62	63	68	57	47	65	52
Erie, Pennsylvania	76	68	70	73	77	79	79	83	88	87	79	77	79	70
	61	60	55	55	58	64	65	63	64	72	61	61	69	60
<i>Central Lakes</i>	66	65	59	61	70	71	72	74	76	81	72	62	71	62
Auburn	76	75	76	80	87	88	80	85	92	95	84	76	78	72
	54	54	44	44	52	56	62	63	61	66	56	46	61	47
Fleming	74	70	66	71	85	84	80	81	88	92	84	70	76	73
	58	59	50	48	57	62	65	66	63	71	65	52	63	53
Watkins	78	73	70	76	88	88	83	88	93	96	88	76	81	73
	56	59	45	43	52	50	58	64	58	66	60	55	62	51
Romulus	76	76	73	77	86	90	90	87	93	97	82	75	77	72
	57	58	53	46	55	56	56	63	60	68	55	48	63	50
Ithaca	76	71	69	75	84	87	81	85	90	93	84	72	77	79
	56	57	45	43	52	53	60	63	57	65	60	50	63	52
Penn Yan.	78	74	71	78	87	90	81	87	93	95	79	79	80	80
	55	58	46	45	51	54	65	62	62	68	64	47	65	52
Mean	64	64	59	59	65	69	68	69	73	77	70	61	68	61

† Maximum and minimum by the Draper Thermograph. ‡ Received too late to be used in
(2a) Intake conduit, nine miles north of city.

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
57	66	64	48	53	52	45	53	53	57	57	58	48	46	52	59	59.0
66	74	86	59	68	70	52	59	69	69	61	71	69	56	60	69	57.8
40	42	53	31	35	42	36	37	38	38	38	40	41	37	37	41	
70	.....	.....	57	62	57	56	62	65	63	76	63	55	59	67	75	57.2
39	48	41	33	54	43	31	41	36	51	46	50	32	25	35	45	
78	86	68	62	64	60	60	68	64	62	68	66	50	60	66	70	60.4
42	62	50	38	48	44	34	50	40	54	46	58	40	34	40	50	
75	82	77	61	66	57	56	61	66	64	74	65	57	60	65	74	60.5
49	53	47	39	51	42	34	46	47	53	47	49	39	33	43	47	
60	73	62	56	59	50	50	56	55	59	62	65	55	49	56	68	62.3
76	85	70	66	60	60	59	67	63	66	72	78	60	69	67	73	62.8
53	67	50	42	55	39	41	44	48	50	50	58	45	37	42	51	
78	80	72	66	64	50	58	66	67	69	70	68	58	62	68	71	63.0
51	69	51	46	50	44	42	53	50	49	58	52	44	44	47	62	
75	91	73	69	65	56	59	67	65	66	75	77	57	59	73	83	61.4
41	53	50	41	54	45	37	40	43	49	48	55	43	32	40	52	
76	89	70	69	64	53	60	66	63	68	77	77	57	61	74	84	63.0
48	60	50	43	53	41	38	43	49	51	49	52	44	36	43	54	
69	87	73	72	65	55	61	68	64	68	74	75	59	60	72	82	61.6
46	56	56	40	55	47	38	43	43	49	45	53	45	35	38	52	
74	91	81	72	67	55	64	70	65	74	78	78	63	70	75	85	65.2
54	61	62	54	50	45	38	56	44	48	51	60	38	40	45	55	
73	90	70	69	64	56	61	68	62	61	75	76	59	58	68	78	61.6
42	52	50	42	54	45	39	38	46	51	50	53	42	36	45	45	
75	88	76	68	65	56	61	68	.....	79	71	76	59	69	73	80	63.2
41	58	54	42	56	46	37	47	.....	49	51	58	44	35	43	57	
67	88	70	68	62	55	57	66	61	61	72	74	56	58	66	76	61.0
46	55	54	43	55	47	43	43	48	53	49	55	46	46	44	49	
72	88	69	65	61	16	56	64	66	60	72	65	59	55	63	76	59.3
37	50	52	32	53	44	38	39	47	51	45	55	41	40	35	45	
72	91	75	68	64	57	58	69	62	64	74	76	56	58	69	83	61.2
43	56	52	45	56	47	40	42	47	51	53	52	44	38	42	50	
75	86	67	67	64	54	59	67	64	65	74	73	56	58	68	78	64.0
57	67	51	46	53	48	46	46	51	53	52	55	48	40	46	55	
59	74	64	54	61	50	48	54	54	55	61	65	50	47	55	67	62.7
77	92	73	68	66	56	69	71	66	59	75	75	56	63	70	81	62.0
42	55	47	38	54	43	35	41	45	50	45	49	38	32	39	49	
70	89	80	68	66	60	58	66	59	58	74	75	60	55	70	86	63.3
46	58	53	43	57	44	38	38	48	51	49	56	44	37	43	54	
76	96	80	70	77	56	60	69	58	62	75	82	59	60	72	85	62.9
41	48	56	39	47	46	39	37	45	49	44	47	46	36	36	48	
74	94	76	68	68	57	58	69	62	60	74	78	57	60	69	82	63.2
47	65	50	41	51	44	38	39	47	50	49	54	44	37	42	51	
74	90	74	67	74	54	57	67	58	59	74	77	57	57	69	80	61.7
40	53	51	39	53	46	41	38	47	49	44	55	45	36	38	47	
76	94	77	68	66	55	59	69	59	64	75	79	56	60	72	85	63.3
45	54	51	49	53	41	39	41	48	50	48	54	44	36	40	51	
58	66	62	52	58	52	48	51	53	56	59	61	51	47	53	60	60.3

computing means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir;

DAILY AND MONTHLY PRECIPITA

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i>	0.08	0.28	0.60	0.00	0.00	0.00	0.66	T.	0.00	0.00	0.00	0.00	0.28	0.60
Alfred.....		.23						T.					.34	
Angelica.....		.13						T.					.32	
Boliver.....	T.	.28											.14	
Franklinville.....	T.	.69											.26	
Humphrey.....													.20	
Little Valley.....														
Napoli.....														
Cherry Creek.....	.08	.15											.10	
Jamestown.....	T.	.36												
Elmira.....		1.10											.29	
Pine City.....	.69													
Akron.....		.22											.40	
Avon.....													.56	
Mt. Morris.....		T.											.40	
Nunda.....														
Lockport.....		.12											.66	
Tyrene.....														
Wedgewood.....		1.10											.12	
Addison.....		.84											.40	
Atlanta.....		.25											.24	
Haskinville.....		.35											.25	
South Canisteo.....	.65							T.					.33	
Arade.....	.01	.10											.29	
<i>Eastern Plateau</i>	0.13	0.69	T.	T.	0.00	?	0.23	0.00	0.00	0.00	0.05	T.	0.12	T.
Binghamton (1).....		1.13					T.						.11	
Binghamton (2).....		1.15					T.						.14	
Chenango Forks.....										1.00				
Oxford.....		.95											.16	
Cortland.....		.56					T.						T.	
South Kortright.....		1.13					1.47							
Bouckville.....		.35					T.						.33	
Fayetteville.....	.19												.03	
Middletown.....		1.60				*	1.18					T.	T.	
Port Jervis.....		.82					.12						.02	
Warwick.....		.94					.13							
Cooperstown.....		.50					.71						.20	
Garrattsville.....	.63						.45							
New Lisbon.....		.66					.64						.15	
Oneonta.....	1.33						.61						.19	
Schenevus.....	.80						.45						.09	
Perry City.....		.63											.30	
Newark Valley.....		1.17					T.						.10	
Straits Corners.....		1.12					T.						.10	
Waverly.....		.84											.29	
Dryden.....		.51	T.	T.			T.						.60	T.
Mohonk Lake.....		1.08					.15							
<i>Northern Plateau</i>	0.04	0.09	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.25	0.01	0.35	0.00
Elizabethtown.....														
Lake Placid.....											.80		.30	
Saranac Lake.....							T.				.85	.10	.37	
Gloversville.....		.40					T.				.01		.24	
Little Falls (2a).....	.20	T.					.04						.05	
North Lake.....	.07						.43						.45	
Lowville.....							.51				.10		.30	
Number Four.....	.02						.81				.20		.91	
Kings Station.....		.35									.05		.20	

TION FOR SEPTEMBER, 1897—(INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.02	0.05	0.19	0.00	0.06	0.30	T.	T.	0.14	0.46	0.01	0.03	T.	0.00	0.00	0.00	1.95
.....	T.	.29	.....	*	†.53	.....	.....	*	†.48	.....	.01	.....	.....	.....	.....	2.88
.....	T.	.38	.....	T.	.19	.....	.....	T.	.71	.....	T.	.01	.....	.....	.....	1.74
.....	T.	.17	.....	.....	.08	.30	.....	.27	.82	.....	T.	.....	.....	.....	.....	2.06
.....	.....	.23	.....	.....	.08	.....	.....	.08	.16	.....	T.	.....	.....	.....	.....	0.90
.....	.....	.40	.....	.....	.....	.....	.....	.15	.48	.....	.02	.....	.....	.....	.....	1.25
.....
.....	.....	.30	.....	.....	.43	.....	.....	T.	.05	.....	T.	.....	.....	.....	.....	1.11
.....	.01	.17	.....	.....	.21	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	0.75
.....
.....	.04	.22	.....	.....	.80	.....	.....	.04	1.28	.....	.....	.....	.....	.....	.....	3.70
.32	T.	.12	.....	.....	.83	.....	.....	.26	1.23	.03	.....	.....	.....	.....	.....	3.48
.....	.....	T.	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.62
.....	.49	.....	.....	T.	.19	.....	T.	T.	.....	.....	.18	.....	.....	.....	.....	1.42
.....	.....	.....	.....	.....	.25	.....	.....	T.	.35	.....	T.	.....	.....	.....	.....	1.60
.....
.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	0.90
.....	T.	.09	.....	.15	.48	.03	.....	.08	.51	.....	.10	.....	.....	.....	.....	2.66
.....	T.	.14	.....	.07	.70	.....	.....	.29	.46	.....	T.	.....	.....	.....	.....	2.90
.....	.....	.25	.....	T.	.32	.....	.....	.12	1.06	.....	.10	.....	.....	.....	.....	2.34
.....	.....	.50	.....	T.	.50	.....	.....	.25	.80	.08	T.	.....	.....	.....	.....	2.73
.....	.38	.....	.....	.70	.10	.....	.....	1.00	.30	.....	.01	.....	.....	.....	.....	3.47
.....	.....	.34	.....	T.	.10	.....	.....	.07	.13	.....	.09	.....	.....	.....	.....	1.13
T.	0.06	0.15	0.05	0.09	0.56	0.01	0.02	0.31	0.55	0.03	0.09	T.	0.00	0.00	0.00	3.16
.....	.18	.20	.....	.....	.58	.....	.....	.45	.80	.09	.03	.....	.....	.....	.....	3.57
.....	.09	.06	.....	T.	.57	.....	.....	.31	.69	.....	.01	.01	.....	.....	.....	3.03
.....	.....	.....	1.00	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	.....	.....	2.45
.....	.....	.25	.....	.....	.78	.....	.....	.13	.83	.....	.03	.....	.....	.....	.....	3.13
.....	.23	.55	.....	.10	.66	.....	.23	.32	.48	.....	.....	.....	.....	.....	.....	3.13
.....	.....	.54	.....	.....	.66	.....	.....	*	†.87	.....	.....	.....	.....	.....	.....	4.67
.....	.....	.....	.....	.....	1.02	.05	.....	.....	.97	.....	.29	.....	.....	.....	.....	3.01
.....	.....	.....	.....	.....	.42	.....	.....	.06	.76	.....	.....	.....	.....	.....	.....	1.46
T.	.....	.....	.....	.....	.....	.....	.....	1.08	.....	.....	.....	.....	.....	.....	.....	2.86
.....	.....	.....	.....	.....	.24	.....	.31	.58	.13	.....	.....	.....	.....	.....	.....	2.22
.....	.....	.....	.....	.....	.19	.....	.....	.31	.50	.....	.17	.....	.....	.....	.....	2.24
.....	.....	.20	.....	.15	.90	.....	.....	.15	.38	.....	.21	.....	.....	.....	.....	3.40
.....	T.	.05	.....	*	†1.21	.....	.....	.....	.53	.....	.27	.....	.....	.....	.....	3.14
.....	.....	.17	.....	T.	.88	.....	.....	.11	.42	.....	.16	.....	.....	.....	.....	3.19
.....	.....	.....	.12	.85	.....	.....	.....	.47	.....	.....	.27	.....	.....	.....	.....	3.84
.....	.....	.08	.....	.....	.81	.11	.....	.20	.30	.....	.17	.....	.....	.....	.....	3.01
.....	.....	.10	.....	.....	.19	.30	.....	.15	.79	.....	.12	.....	.....	.....	.....	2.58
.....	.35	.22	.....	T.	1.00	.....	.....	.85	1.00	.....	.02	.....	.....	.....	.....	4.71
.....	.....	.....	.....	.....	.20	.95	.....	.64	1.00	.....	T.	T.	.....	.....	.....	4.01
.....	.....	.03	.08	.....	.34	.71	.....	.32	.78	.....	.03	.....	.....	.....	.....	3.42
T.	.36	.75	T.	*	†.73	.02	.....	.28	1.08	.....	.12	T.	.....	.....	.....	4.45
.....	.08	.....	.....	.....	†.58	.....	.....	.28	.....	.....	.....	.....	.....	.....	.....	1.89
0.00	0.03	0.03	0.00	0.17	0.46	0.00	0.00	0.06	0.36	0.01	0.19	T.	0.00	0.01	0.00	2.23
.....	.18	.....	.....	.38	.12	.....	.....	.....	.33	.....	.14	.....	.....	.10	.....	2.35
.....	.08	.....	.....	.....	.87	.....	.....	.04	.20	.....	.26	T.	.....	.....	.....	2.75
.....	.....	.....	.....	T.	.50	.....	.....	.26	.22	.....	.15	.....	.....	.....	.....	1.78
.....	T.	.....	.....	.70	.19	.....	.....	.05	.51	.05	.06	.....	.....	.....	.....	1.85
.....	.....	.09	.....	.....	.74	.....	.....	.09	.47	.....	.22	.....	.....	.....	.....	2.56
.....	.....	.09	.....	.....	.05	.....	.....	.....	.33	.....	.23	.....	.....	.....	.....	1.72
.....	.....	.08	.....	*	.....	.....	.....	.....	.68	.....	.30	T.	.....	T.	.....	3.37
.....	.....	.....	.....	.....	.75	.....	.....	.....	.15	.....	.15	.....	.....	.....	.....	1.65

TATION FOR SEPTEMBER — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
0.00	0.00	T.	0.00	T.	0.09	0.00	0.01	0.42	0.19	0.02	0.05	0.02	0.00	0.00	0.00	1.90
.....03	.....	.....	1.17	.....	.....	.....	.....	.....	.....	.....	1.90
.....01	.....	T.	.14	.84	.....	.....	.05	.....	.....	.....	1.64
.....	T.	.....	.....	.06	.53	.....	.....	.10	.....	.....	.....	.....	1.67
.....20	.....	.....	.36	.....	.....	.10	.....	.....	.....	.....	2.30
.....	T.	.....	.....	.04	.....	.....	.25	.16	T.	.06	.....	.....	.....	.....	1.20
.....32	.....	.....	.21	.32	.....	.18	.03	.....	.....	.....	2.75
.....	T.	.....	.....	.05	.....	.....	.33	T.	.11	.....	.....	.....	.....	.....	1.84
0.00	T.	0.07	0.00	0.00	0.47	0.06	0.00	0.06	0.13	T.	0.05	0.08	0.00	0.00	0.00	2.02
.....	T.	.....	.....	.82	.05	.....	.04	.18	.....	.06	T.	.....	.....	.....	1.87
.....	.01	.....	.....	.....	.78	.17	.....	.09	.21	T.	.11	.....	.....	.....	.....	2.15
.....22	.....	.....	.02	.05	.....	.04	.08	.....	.10	.....	.....	.....	.....	1.62
.....02	.....	.....	.28	.....	.....	.22	.42	.....	T.	.....	.....	.....	.....	1.83
.....
.....47	.....	.....	.85	.....	.....	*	†.53	.....	.08	.....	.....	.....	.....	3.99
.....30	.....	*	.....	†.80	.....	.80	.....	.....	.....	2.90
.....	1.74
.....27	.05	.....	*	†.49	.....	.12	.....	.....	.....	.....	1.74
.....	1.79
.....45	.....	.....	T.	.05	.....	.....	.....	.....	.....	.....	1.25
.....73	.....	.....	T.	T.	.....	.....	.....	.....	.....	.....	1.82
.....50	T.	.....	T.	.....	.....	.05	.03	.....	.....	.....	1.55
0.00	0.02	0.00	0.00	0.38	0.35	0.06	0.00	0.28	0.38	0.00	0.14	0.00	0.00	0.00	0.00	2.00
.....73	.....	.....	.....	.29	.30	.....	.15	.....	.....	.....	.....	1.90
.....72	.....	.....	.29	.32	.....	.11	.....	.....	.....	.....	1.98
.....62	.....	.....	.04	.57	.....	.14	.....	.....	.....	.....	1.80
.....	.06	.....	.....	.77	.05	.....	.....	.49	.34	.....	.15	.....	.....	.....	.....	2.30
0.00	0.00	0.02	0.00	T.	0.53	0.20	0.00	0.01	0.15	0.02	0.06	0.04	0.00	0.00	0.00	1.41
.....08	.....	.....	.40	.75	.....	.....	.05	.08	.....	.16	.....	.....	.....	1.90
.....63	.....	.....	.....	.15	.....	.08	.02	.....	.....	.....	1.32
.....57	.03	.....	.....	.15	.15	.07	.....	.....	.....	.....	1.09
.....	T.	.52	.....	.....	.03	.21	.....	.07	.....	.....	.....	.....	1.23
0.00	0.00	0.00	0.00	0.02	T.	0.00	0.04	0.00	T.	0.00	0.19	0.00	0.00	T.	0.00	1.12
.....10	.....	.....	.....	.....	0.79
.....	T.	.....	.....	.....	.....	.....	.31	.....	.....	.....	.....	1.24
.....
.....06	.....	.....	.05	.....	.....	.27	.....	.....	.....	.....	1.70
.....02	.....	.02	.....	.....	.....	.13	T.	.....	.15	.....	.....	T.	.....	0.56
.....11	.....	.....	.....	.....	.....	.....	.....	.....	.13	.....	.....	.....	.....	1.31
0.00	0.02	0.04	0.00	0.04	0.09	0.04	T.	0.06	0.14	0.02	0.05	0.01	0.00	0.00	0.00	0.83
.....	.32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.58
.....	T.	.01	.....	T.	T.	.....	.....	T.	.01	.....	T.	.....	.....	.....	.....	0.31
.....02	.....	.....	.....	.21	.....	.....	.....	.....	.....	.....	0.78
.....02	.....	.01	.52	.....	.....	T.	.01	.....	.09	.....	.....	.....	.....	0.98
.....07	.....	.01	.14	.....	.....	T.	T.	.....	.07	.....	.....	.....	.....	0.46
.....
.....	T.	.17	.....	.....	.....	.....	.....	.19	.....	.....	.....	.....	1.37
.....03	.....	.01	.....	.....	.....	*	*	.....	.02	.....	.....	.....	.....	0.28
.....21	.....	.....	.....	.....	.....	.....	T.	.....	T.	.....	.....	.....	.....	1.00
.....	0.89
.....24	.11	.....	.54	.09	.....	.....	.....	.....	.....	.....	1.20
.....07	.....	.....	.....	.....	.....	.....	.....	.....	.04	.....	.....	.....	.....	0.29
.....14	.....	.03	.....	.....	.....	.02	.02	.....	.05	.....	.....	.....	.....	0.47
.....05	.....	.70	.....	.....	.61	.....	.....	.....	.....	.....	.....	1.36
.....01	.....	.08	.01	T.	.....	.01	.33	.....	.10	.....	.....	.....	.....	0.81
.....
.....03	.....	*	†.18	T.	.....	.03	.25	.....	.10	.....	.....	.....	.....	0.69
.....26	.10	.....	.....	.35	.27	.....	.13	.....	.....	.....	1.49
.....21	.04	.....	.....	.30	.34	.12	.....	.....	.....	.....	1.18
.....10	.32	.....	.....	.17	.25	.09	.....	.....	.....	.....	1.12
.....	.06	.12	.....	.....	.....	.....	T.	T.	T.	.....	T.	.....	.....	.....	.....	0.54

DAILY AND MONTHLY PRECIPITATION

STATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes.</i>	0.03	0.22	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	T.	0.03	0.36	0.00
Auburn.....	.03	.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.60	.....
Fleming.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.93	.....
Sherwood.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.01	.25	.....	.....
Skaneateles.....	.10	.10	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	.36	.....
Watkins.....	.....	.82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.11	.....
Romulus.....	T.	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.33	.....
Ithaca.....	T.	.66	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.31	.....
Penn Yan.....	.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.23	.....
Average.....	0.07	0.28	T.	T.	T.	T.	0.07	0.02	T.	T.	0.09	0.01	0.28	0.01

† Record for the month incomplete. ‡ Received too late to be included in the averages.
 § Calculated from values at other stations.

TATION FOR SEPTEMBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.00	0.12	0.17	T.	0.17	0.42	T.	0.00	0.27	1.24	0.00	0.13	0.00	0.00	0.00	0.00	3.23
.....	.....	.09	.....	.21	.32	.....	.....	.24	1.58	.....	.13	.....	.....	.....	.....	3.29
.....	.....	.30	T.	.23	T.	.....	.....	*	†2.00	.....	T.	.....	.....	.....	.....	3.46
.....	.73	.....	.....	.58	.09	.....	.....	.99	.30	.....	.12	.....	.....	.....	.....	3.07
.....	.....	.02	.....	.11	.39	.02	.....	.20	1.12	.....	.26	.....	.....	.....	.....	2.73
.....	.09	.12	.....	.05	.50	.....	.....	.05	.86	.....	.15	.....	.....	.....	.....	2.75
.....	.....	.51	.....	.....	1.04	.....	.....	.08	1.80	.....	.11	.....	.....	.....	.....	3.95
.....	.05	.30	.....	.14	.63	.....	.....	.30	2.15	.....	.17	.....	.....	.....	.....	4.72
.....	.12	.....	.....	.07	.39	.....	.....	.04	.86	.....	.08	.....	.....	.....	.....	1.90
T.	0.03	0.07	T.	0.09	0.33	0.03	0.01	0.16	0.36	0.01	0.10	0.02	0.00	T.	0.00	1.98

* Amount included in next measurement. † Not included in computing averages. § Interpo-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE—(DEGREES FAHR.).									
		Normal for the month of September.	Length of record, years.	Record begins.	Record ends.	Mean for September, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR SEPTEMBER.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau</i>		60.4	...	...	...	60.8	+0.8	...	...	...	...
Angelica.....	Allegany	58.2	15	1854	1897	59.3	+1.1	61.3	1894	53.6	1871
Humphrey.....	Cattaraugus	59.6	15	1883	1897	60.6	+1.0	64.5	1884	52.7	1883
Elmira.....	Chemung	62.4	19	1851	1897	62.7	+0.3	66.6	1891	57.6	1860
<i>Eastern Plateau</i>		58.7	...	...	...	59.2	+0.5	...	...	...	...
Oxford.....	Chenango	58.8	29	1828	1897	58.4	-0.4	66.1	1846	53.9	1829
Cortland.....	Cortland	57.1	35	1829	1897	59.2	+2.1	62.6	1846	52.5	1848
Cooperstown.....	Otsego	58.2	44	1854	1897	57.5	-0.7	66.7	1887	53.3	1860-'63
Waverly.....	Tioga	60.7	16	1882	1897	61.9	+1.2	67.2	1888	55.7	1883
<i>Northern Plateau</i>		57.2	...	...	...	57.5	+0.3	...	...	...	...
Lowville.....	Lewis	57.2	30	1827	1897	57.5	+0.3	61.9	1846	52.5	1829
<i>Atlantic Coast</i>		65.2	...	...	...	61.9	-0.3	...	...	...	...
New York city.....	New York	66.0	27	1871	1897	65.0	-1.0	72.4	1881	61.2	1871
Setauket.....	Suffolk	64.3	13	1885	1897	64.8	+0.5	67.8	191-'95	61.6	1887
<i>Hudson Valley</i>		63.0	...	...	...	60.9	-2.1	...	...	...	...
Albany.....	Albany	63.1	24	1874	1897	63.0	-0.1	71.0	1881	58.5	1875
Honeymead Brook.....	Dutchess	61.1	17	1881	1897	59.2	-1.9	65.1	1891	56.2	1893
West Point.....	Orange	64.7	68	1826	1897	60.6	-4.1	...	...	...	...
<i>Champlain Valley</i>		59.2	...	...	...	57.9	-1.3	...	...	...	...
Plattsburg Barracks..	Clinton	59.2	42	1839	1897	57.9	-1.3	65.3	1881	54.8	1893
<i>St. Lawrence Valley</i>		59.6	...	...	...	58.5	-1.1	...	...	...	...
Madison Barracks.....	Jefferson	61.1	38	1839	1897	57.8	-3.3	70.4	1881	56.3	1842
Canton.....	St. Lawrence	60.8	35	1862	1897	57.2	-3.6	70.4	1881	54.1	1863
North Hammond.....	"	58.5	18	1866	1897	60.4	+1.9	67.4	1869	55.1	1866
Potsdam.....	"	57.8	29	1828	1896	...	...	63.0	1846	52.6	1893
<i>Great Lakes</i>		61.8	...	...	...	62.4	+0.6	...	...	...	...
Buffalo.....	Erie	62.1	27	1871	1897	63.0	+0.9	71.5	1889	57.7	1883
Rochester.....	Monroe	62.2	26	1871	1897	63.0	+0.8	71.4	1881	56.7	1871
Fort Niagara.....	Niagara	62.7	42	1842	1897	65.2	+2.5	71.0	1881	57.5	1883
Baldwinsville.....	Onondaga	60.6	20	1854	1897	61.6	+1.0	65.5	1891	56.0	1863
Oswego.....	Oswego	61.6	27	1871	1897	61.0	-0.6	70.3	1881	57.2	1893
Palermo.....	"	60.0	44	1854	1897	59.3	-0.7	65.1	1881	54.5	1883
Erie, Pennsylvania...	Erie	63.5	25	1873	1897	64.0	+0.5	71.7	1881	58.6	1888
<i>Central Lakes</i>		60.9	...	...	...	61.7	+0.8	...	...	...	...
Ithaca.....	Tompkins	60.9	19	1879	1897	61.7	+0.8	71.2	1881	56.4	1883
Average departure..		...	...	...	...	...	-0.1	...	...	...	...

AND PRECIPITATION — SEPTEMBER.

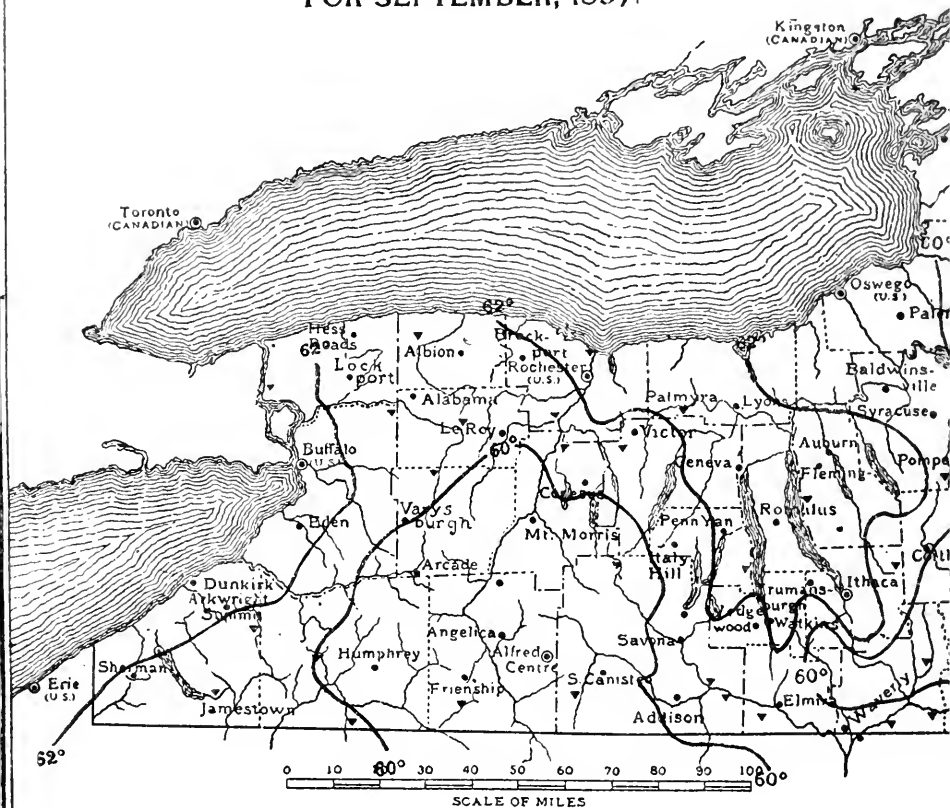
STATION.	COUNTY.	PRECIPITATION—(INCHES).									
		Average for the month of September.	Length of record, years.	Record begins.	Record ends.	Total for September, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR SEPTEMBER.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau</i>		3.35	...	...	...	2.23	-1.12	...	...	...	...
Angelica.....	Allegany.....	3.20	13	1856	1897	1.74	-1.46	8.72	1890	0.68	1871
Humphrey.....	Cattaraugus..	4.02	15	1883	1897	1.25	-2.77	9.00	1890	1.25	1897
Elmira.....	Chemung.....	2.82	19	1851	1897	3.70	+0.88	6.14	1894	0.63	1855
<i>Eastern Plateau</i>		3.41	...	...	...	3.06	-0.35	...	...	...	...
Oxford.....	Chenango.....	3.51	27	1829	1897	3.13	-0.38	7.76	1853	1.62	1892
Cortland.....	Cortland.....	3.57	20	1850	1897	3.13	-0.44	6.56	1861	1.51	1863
Cooperstown.....	Otsego.....	3.39	44	1854	1897	3.40	+0.01	7.24	1890	1.17	1871
Port Jervis.....	Orange.....	3.28	13	1880	1897	2.22	-1.66	6.06	1894	0.61	1892
Waverly.....	Tioga.....	3.29	16	1882	1897	3.42	+0.13	8.24	1890	1.28	1882
<i>Northern Plateau</i>		2.83	...	...	...	1.72	-1.11	...	...	...	...
Lowville.....	Lewis.....	2.83	33	1827	1897	1.72	-1.11	5.36	1847	0.88	1848
<i>Atlantic Coast</i>		3.58	...	...	...	1.42	-2.16	...	...	...	...
New York city.....	New York.....	3.62	27	1871	1897	1.64	-1.98	14.51	1882	0.15	1884
Setauket.....	Suffolk.....	3.54	13	1885	1897	1.20	-2.34	7.22	1889	0.93	1885
<i>Hudson Valley</i>		3.63	...	...	...	1.99	-1.64	...	...	...	...
Albany.....	Albany.....	3.35	24	1874	1897	1.87	-1.48	8.91	1890	1.80	1849
Honeymead Brook.....	Dutchess.....	3.97	17	1881	1897	1.62	-2.35	19.58	1882	0.71	1885
Poughkeepsie.....	".....	2.64	22	1830	1897	1.83	-0.81	5.70	1896	0.20	1846
West Point.....	Orange.....	4.18	50	1849	1849	2.90	-1.28	13.50	1882	0.17	1846
Boyd's Corners.....	Putnam.....	4.01	27	1876	1897	1.74	-2.27	10.77	1888	0.75	1881
<i>Champlain Valley</i> ...		2.82	...	...	...	1.90	-0.92	...	...	...	...
Plattsburg Barracks..	Clinton.....	2.82	38	1840	1897	1.90	-0.92	6.25	1840	0.51	1887
<i>St. Lawrence Valley</i> ...		3.20	...	...	...	1.27	-1.93	...	...	...	...
Madison Barracks.....	Jefferson.....	3.05	37	1840	1897	0.79	-2.26	6.27	1890	0.41	1844
North Hammond.....	St. Lawrence..	3.49	18	1866	1897	1.70	-1.79	10.44	1866	0.69	1871
Potsdam.....	".....	3.06	29	1828	1897	1.31	-1.75	5.13	1846	0.47	1836
<i>Great Lakes</i>		2.99	...	...	...	0.64	-2.35	...	...	...	...
Buffalo.....	Erie.....	3.16	27	1871	1897	0.31	-2.85	7.44	1878	0.31	1897
Rochester.....	Monroe.....	2.31	26	1871	1897	0.46	-1.85	5.69	1876	0.46	1897
Fort Niagara.....	Niagara.....	2.82	41	1842	1897	1.00	-1.82	7.25	1850	0.26	1844
Oswego.....	Oswego.....	2.77	27	1871	1897	0.81	-1.96	6.33	1890	0.76	1881
Palermo.....	".....	3.06	38	1860	1897	0.69	-2.37	7.55	1890	0.69	1897
Erie, Pennsylvania..	Erie.....	3.82	25	1873	1897	0.54	-3.28	8.45	1876	0.54	1897
<i>Central Lakes</i>		3.03	...	...	...	4.72	+1.69	...	...	...	...
Ithaca.....	Tompkins.....	3.03	19	1879	1897	4.72	+1.69	6.62	1890	0.94	1879
Average departure..		...	...	...	...	...	-1.37	...	...	...	...

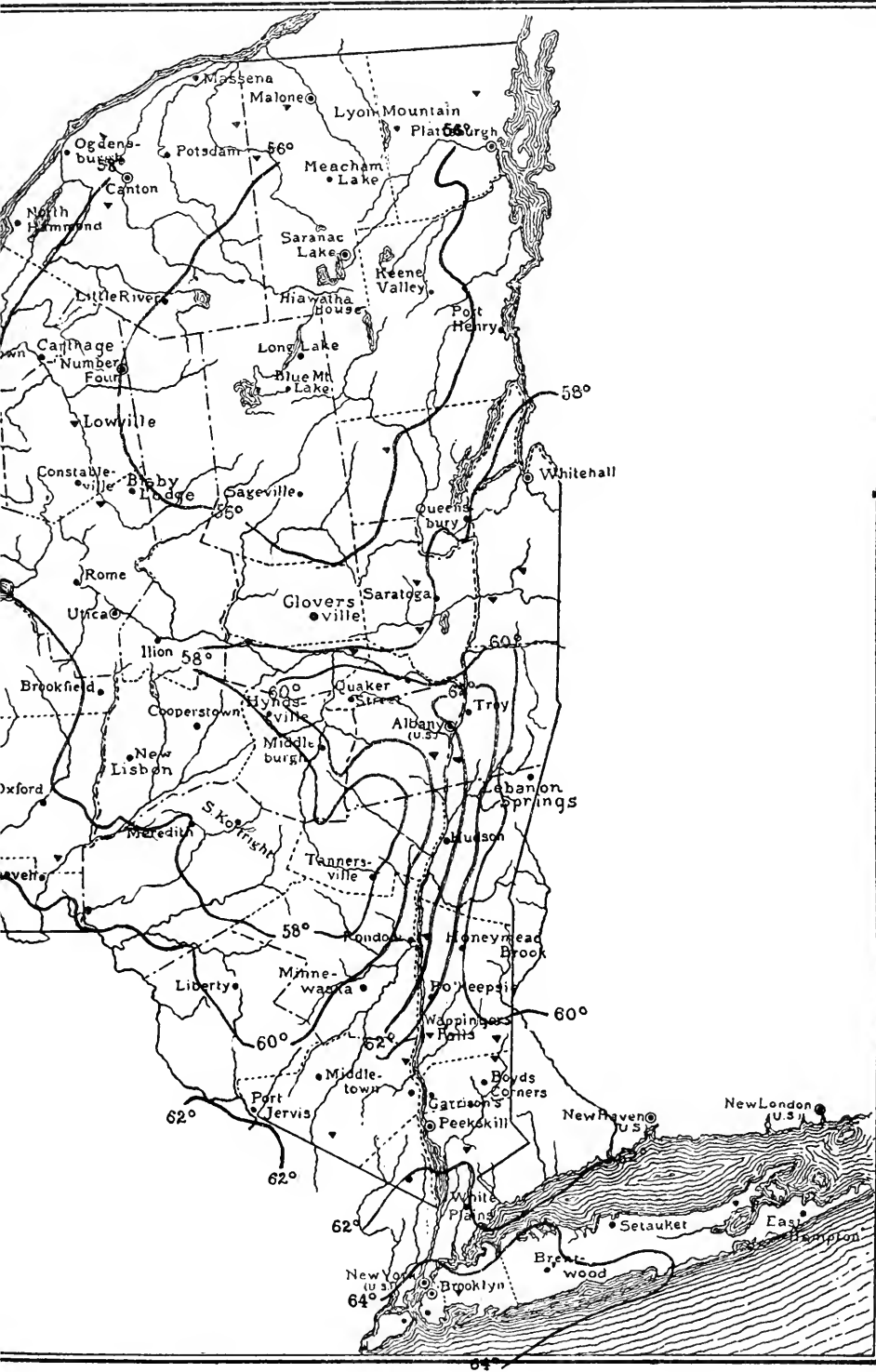
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR SEPTEMBER, 1897.





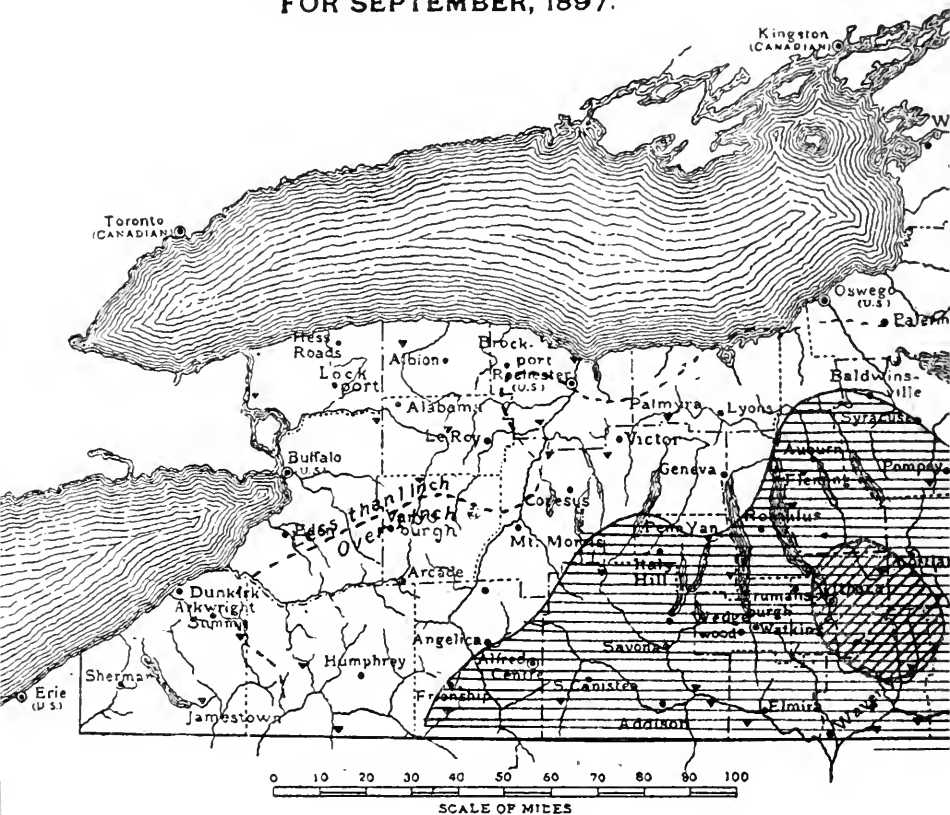


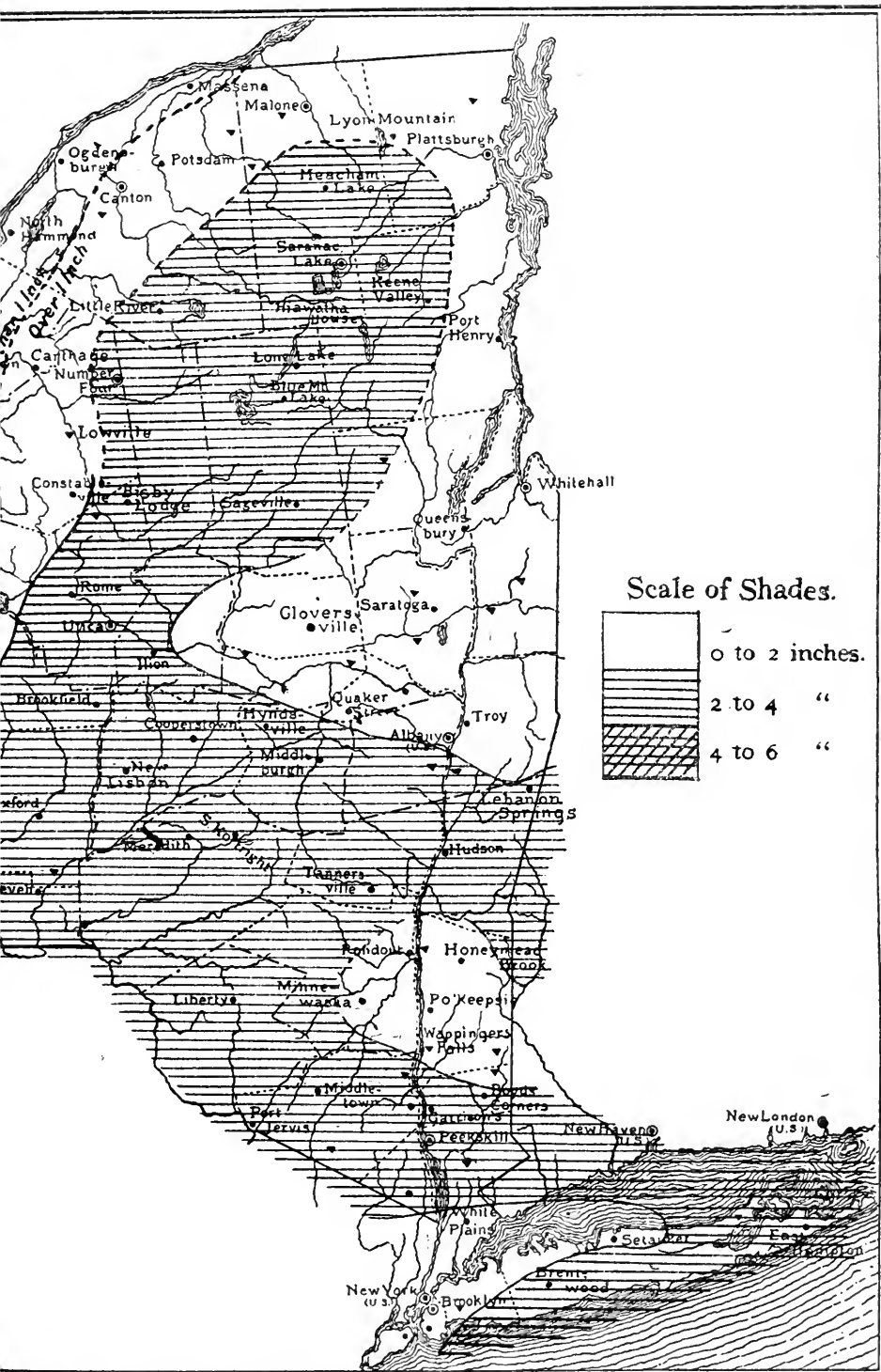
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR SEPTEMBER, 1897.





Meteorological Summary for October, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State was 30.14 inches. The highest barometer was 30.74 inches at Ithaca on the 3d, the lowest being 29.61 inches at Rochester on the 12th and at Oswego on the 28th. The mean pressure decreased from 30.18 inches at the eastern border to 30.11 inches near Lake Erie. The average departure was 0.08 inches above the normal, all stations reporting excesses. The largest departure was 0.12 inches at Albany, and the least 0.06 inches at Erie.

The mean temperature of the State was 51.0 degrees, as derived from observations of maxima and minima at 83 stations. The highest local mean was 56.8 degrees at Brooklyn, while the lowest was 45.9 degrees at North Lake. The highest general daily mean was 69 degrees on the 16th, the lowest being 37 degrees on the 30th. The maximum temperature reported was 90 degrees at West Point on the 17th and at Willets Point on the 1st, and the minimum, 17 degrees at Canton on the 30th and 31st. The mean monthly range of temperature for the State was 58 degrees; the greatest local value being 68 degrees at Waverly, and the least, 43 degrees at Buffalo and Arkwright. The mean daily range was 24 degrees; greatest, 59 degrees at Little Falls (2a) on the 18th; least, 3 degrees at Rochester on the 21st. The mean temperatures of the various sections were as follows: The Western Plateau, 51.3 degrees; the Eastern Plateau, 50.1 degrees; the Northern Plateau, 47.7 degrees; the Atlantic Coast, 55.0 degrees; the Hudson Valley, 51.7 degrees; the Mohawk Valley, 49.0 degrees; the Champlain Valley, 49.8

degrees; the St. Lawrence Valley, 49.3 degrees; the Great Lake Region, 53.2 degrees; the Central Lake Region, 53.4 degrees. The average temperature at 25 stations possessing records for previous years, was 25 degrees above the normal. The values were in excess in all sections, the greatest general departure obtaining in western New York.

The mean relative humidity was 73 per cent. The mean dew point was 42 degrees.

The average precipitation for the State was 1.10 inches, as derived from records of 108 stations. Sixty-three stations reported less than 1 inch, and more than 2 inches fell only in a portion of northern New York, and over small sections in the southeastern, central and southwestern parts of the State. The maximum local rainfall was 2.38 inches at Number Four and Sherwood, while the least was 0.13 inches at Poughkeepsie. A list of the heaviest rates of rainfall will be found in the Table of Meteorological Data. Traces of snow were reported from 18 stations of the Eastern and Western Plateaus and the Central Lake Region. The rainfall in the State was 2.45 inches below the normal amount, as recorded by 27 stations having records for previous years. Deficiencies occurred at all stations, being greatest in the St. Lawrence Valley and least in the northern-central highlands. The rainfall was the least observed for October at 8 stations, one of them, Cooperstown, having a record for 44 consecutive years.

The average number of days on which the precipitation amounted to 0.01 inches or more was 5.1. The rain frequency was greatest near the Atlantic Coast, and least over the upper Hudson and Champlain Valleys. The average number of clear days was 15.2; of partly cloudy days, 7.9; and of cloudy days, 7.9; giving an average cloudiness of 43 per cent. The least cloudiness obtained in the eastern, central and northeastern sections.

The prevailing winds were from the southwest. The average total wind-travel at 6 stations of the National Bureau was 7,579 miles, or about the usual mileage for the month. The maximum velocity recorded at the above stations was 60 miles per hour at New York city on the 17th.

Electrical storms (including distant thunder or lightning) were reported as follows: On the 2d at Bedford; on the 3d at Honey-mead Brook; on the 12th at 12 stations in all sections; on the 16th at Number Four; on the 22d at South Canisteo; on the 28th at 19 stations in all parts of the State excepting along the eastern border; on the 30th at Humphrey.

Hail was reported at 2 stations on the 21st and 29th; and sleet fell at Ithaca on the 28th and 29th.

Auroræ were noted at 2 central stations on the 18th, and at 4 scattered stations on the 27th.

Solar halos were observed on the 15th and 31st; and lunar halos or coronæ, on the 14th.

Frosts were reported on 20 days, the most severe occurring about the 3d (the first of the season in many of the warmer sections) the 8th to 10th, 17th to 20th, 30th and 31st. Ice formed on the high-lands, on the 10th, 18th and 30th, and a "hard freeze" occurred in the colder localities on the 10th and 30th. Some stations adjacent to the lakes and ocean report that no killing frosts had occurred thus far during the season.

GENERAL FEATURES OF THE WEATHER.

The average temperature for this month was considerably higher than any value for October since 1882, with the single exception of October, 1894. The range of temperature was large, the first 10 days showing a deficiency which amounted to 10 degrees on the

10th. The warmest period extended from the 11th to 17th, culminating on the 15th and 16th, which were the warmest October days for the 19 years' record of the Ithaca station. From the 19th to the 30th the temperature was continuously above the normal, but the deviation was not large.

The rainfall over the greater part of New York ranks among the least recorded for October, and the average for the State was less than for any preceding month since the establishment of this Bureau in 1889. A severe drouth prevailed in the western and central sections, and portions of the Hudson and Champlain Valleys, groundwater being reported as lower than for many years past. Winter wheat and pastures suffered considerably, and in many cases the ground was too dry for plowing.

Severe frosts occurred unusually late this autumn, and in the vicinity of bodies of water vegetation escaped injury throughout the month, even as far north as Lake Champlain. Foliage commenced to change color about or before the 1st in central New York, the tints being remarkably brilliant during the ten days following. Extensive forest fires, mainly near or over the Pennsylvania border, were of frequent occurrence, notably about the 19th to 21st, when the sun was obscured by smoke over the greater part of the State.

Heavy fogs were unusually frequent, especially along the lakes. The cloudiness was below the average for October in all sections.

Six areas of high and eight areas of low pressure influenced our weather conditions this month; the latter number being slightly less than the average storm frequency for October. Six of the depressions passed over or beyond our northern border, the remainder being ocean storms. The "highs" were, in most cases, large and strongly developed, generally covering the Central and

Northeastern States in their eastward course. The atmospheric movements were rapid during the first half of the month, the velocities then decreasing somewhat. The following is a brief account of the pressure systems of October:

The last depression of September had reached the Northeastern coast by the 1st and was followed by

High I, 30.7 inches, reaching from Canada to the Gulf of Mexico on the 2d, and with maximum pressure over southeastern New York on the 3d and 4th, giving severe frosts on the highlands of that section. Light showers on the 2d, mainly along the coast, preceded the advance of the high, fair weather following until the 6th.

Low I, 29.7 inches, passed over our northern border on the 6th, giving light general rains, while the temperature rose slightly above the normal; precipitation continued with the advance of a cool wave due to

High II, 30.2 inches, a broad area which moved from the Central to Eastern States on the 7th and 8th, bringing severe frosts at scattered stations.

Low II, 29.6 inches, passing over Canada on the 9th, raised the temperature slightly, but brought no appreciable rain.

High III, 30.4 inches, passed from the Missouri Valley section to the Northeastern States on the 9th and 10th, also spreading along the coast. It was accompanied by clear weather and a severe "freeze" in the colder sections.

Low III, 29.4 inches, a large depression passed over British America and the lake region on the 11th and 12th. The temperature rose about 10 degrees above normal, and the largest general rainfall of the month occurred on the 12th, the heaviest rain falling in the eastern and northern counties.

High IV, 30.5 inches, developed mainly over the lakes and Eastern-Central States on the 13th, with falling temperature. The area passed to the Central and Southern coast on the 15th and 16th, giving hot southerly winds toward

Low IV, 49.8 inches, which on the 14th and 15th formed a "trough" of low pressure from the lakes to Texas. The area concentrated north of this State on the 16th, when an unseasonably high temperature prevailed, while a considerable rainfall occurred along the lakes and in the northern section. This area was followed by high and cold winds flowing out of

High V, 30.5 inches, reaching the upper lakes from the West on the 17th, thence passing northeastward, and lingering on the coast until the 22d. The temperature rose slightly above the normal with the advance, of

Low V, 29.9 inches, a shallow depression moving over the lakes and northeastward on the 21st and 22d, bringing light rains in the central section and along the lakes.

Low VI, central over the Atlantic, gave high winds along the coast on the 21st.

High VI, 30.4 inches, covered the Western-Central States on the 22nd, thence spreading toward V in the northeast, and shifting slowly over the Northeastern States and coast until the 28th. The weather was generally fair during this period; but showers occurred along the coast on the 23d, and continued during two days following owing to the presence of

Low VII, 29.7 inches, which remained off the Carolina coast from the 25th to 28th, diminishing. Fair and mild weather prevailed from the 26th to 28th, when a further increase of temperature occurred, due to

Low VIII, 29.8 inches, a V-shaped area passing over the lakes and northeastward, accompanied by general thunder showers. The temperature fell below the normal in the rear of the storm, the 30th being the coldest day of the month ; many stations reported the first snow flurries of the season on this date.

NOTES OF OBSERVERS AT THE FOLLOWING STATIONS: Perry City, streams low ; some wells failed for the first time in 20 years ; winter wheat looks well. Bouckville, winter wheat suffering slightly from drouth. Ticonderoga, no killing frost this month. Lake George, the first October in 20 years or more without snowfall. North Hammond, too dry for plowing ; pastures short ; wells and streams drying up ; the St. Lawrence River very low. Westfield, no killing frosts reported. Appleton, a barge ashore near by on the 27th owing to dense fog on Lake Ontario.

Central and southern stations generally report a smoky atmosphere on the 1st, 18th to 21st, 27th and 28th.

Wild geese were commonly seen flying south on the 17th to 19th in the western section, and on the 28th and 29th in the east. The first wild geese were seen at Appleton, near Lake Ontario, on the 7th.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERATURE.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.
<i>Western Plateau</i>											51.3	87	15
Alfred	Allegany	1795									48.6	50.1	82
Angelica	"	1340									51.0	82	15
Bolivar	"	1809									49.2	83	b
Franklinville	Cattaraugus	1593									50.4	83	15
Humphrey	"	1950									52.2	52.4	82
Arkwright	Chautauqua	1260									52.8	76	c
Jamestown	"	1324									51.2	82	15
Elmira	Chemung	863									53.6	86	16
Avon	Livingston	535									51.8	86	16
Mt. Morris	"	525											
Nunda	"												
Lockport	Niagara	650									51.2	51.8	80
Victor	Ontario												
Wedgewood	Schuyler	1350									50.8	52.4	87
Addison	Steuben	1000							60	37	50.6	51.3	86
South Canisteo	"	1480							73	41	48.0	49.5	84
Arcade	Wyoming	1707									50.6	80	15
<i>Eastern Plateau</i>											50.1	88	16
Binghamton (1)	Broome	870									50.0	51.0	85
Binghamton (2)	"	875									51.0	87	16
Oxford	Chenango										48.8	83	15
Cortland	Cortland	1120									52.4	84	16
South Kortright	Delaware	1700									48.2	79	16
Bouckville	Madison	1350									50.8	81	b
Middletown	Orange	700									52.0	52.6	86
Port Jervis	Orange	470									51.3	86	16
Cooperstown	Otsego	1250									48.1	48.5	80
Garrettsville	"										48.9	49.2	80
New Lisbon	"	1234									46.3	47.4	82
Oneonta	Otsego	1100									47.9	50.2	82
Perry City	Schuyler	1058									48.6	49.4	85
Straits Corners	Tioga										49.9	86	16
Waverly	Tioga	824									51.0	51.8	88
Dryden	Tompkins	1079									48.8	83	b
Mobouk Lake	Ulster	1245									52.8	82	16
<i>Northern Plateau</i>											47.7	84	b
Elizabethtown	Essex												
Lake Placid	"										47.3	78	15
Saranac Lake	Franklin										47.2	82	15
Gloversville	Fulton	850									47.3	49.0	84
Little Falls (2a)	Herkimer	1526									47.6	83	16
North Lake	"										45.9	77	16
Lowville	Lewis	900									49.4	80	15
Number Four	"	1571	30.14	30.60	3	29.65	28	0.95	80	38	47.4	78	15
<i>Atlantic Coast</i>											55.0	90	1
Brooklyn	Kings										56.8	85	d
Manhattan Beach	"												
New York city	New York	314	30.16	30.63	3	29.62	29	1.01	73		56.0	86	16
Willels Point	Queens										56.0	90	1

FOR OCTOBER, 1897.

TEMPERATURE — (IN DEGREES FAHR.).										SKY.			PRECIPITATION — (INCHES).						Prevailing direction of wind.
Lowest	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.			
18	18	58	24	50	y	5	20	13.8	9.6	7.6	5.4	0.78	0.48	<i>h. m.</i>	22				
24	10	58	24	41	1	10	30	9	10	12	8	1.02	0.35	1.00	28	T.	S.		
21	18	61	28	46	5	7	21	8	13	10	7	0.65	0.20		7		S. W.		
18	18	65	29	50	y	9	22	13	8	10	6	0.70	0.34		12	T.	S. W.		
19	<i>h</i>	64	28	49	5	6	21	14	4	13	5	0.75	0.38	11.00	7	T.	S.		
27	<i>j</i>	55	24	43	4	8	21	8	14	9	6	0.60	0.26		7	T.	S. W.		
33	30	43	14	25	14	5	20												
25	18	57	21	40	4	9	<i>ag</i>	12	16	3	4	0.69	0.19	13.00	7	T.	S. W.		
27	18	59	23	42	5	8	20	23	0	8	4	0.65	0.40		21		S. E.		
24	18	62	27	48	11	12	16	9	15	7	4	0.72	0.38		21				
								14	13	4	4	0.60	0.20		12		W.		
30	10	50	20	36	11	9	25	12	14	5	3	0.81	0.38		12		W.		
26	30	61	24	42	4	7	22	16	10	5	6	0.74	0.25	1.00	28	T.	S. W.		
24	<i>h</i>	62	26	45	2	8	22	21	3	7	7	0.94	0.48		22	T.	S. W. - N. W.		
20	10	64	28	43	14	12	<i>ah</i>	19	2	10	7	1.04	0.28		28	T.	W.		
26	<i>k</i>	54	24	38	14	8	21	16	12	3	4	0.97	0.46	5.00	7				
18	<i>m</i>	60	26	52	18	5	<i>ag</i>	16.1	7.7	7.2	4.8	0.78	1.06	12.00	12				
24	10	61	27	48	4	5	22	17	4	10	5	0.82	0.39		12	T.	S. E.		
25	10	62	25	44	5	5	22	14	11	6	7	0.66	0.33		12		E.		
20	10	63	30	47	5	11	22	11	13	7	5	0.80	0.41		12		S.		
24	18	64	26	43	17	6	12	21	5	5	5	0.72	0.22		29		S. E.		
28	<i>m</i>	61	23	52	18	10	12				2	0.98	0.73		12				
25	<i>n</i>	56	23	34	8	10	12	16	6	9	4	0.68	0.32	4.00	12		N. W.		
32	13	54	20	38	15	7	12	18	9	4	4	0.73	0.62		12				
25	31	61	22	41	15	6	29	19	9	3	5	1.18	0.76		12		N. W.		
25	10	55	22	37	5	7	22	20	7	4	4	0.64	0.32		12		N.		
23	<i>h</i>	57	24	45	17	12	<i>bb</i>	14	7	10	2	0.59	0.53		12		W.		
18	10	64	29	49	5	10	22	15	5	11	5	0.73	0.44	3.00	12		S.		
24	<i>m</i>	58	27	43	5	12	22				3	0.46	0.29		12				
22	10	63	24	44	14	5	21	11	13	7	7	0.86	0.27		21		S. W.		
21	<i>h</i>	65	28	43	<i>aa</i>	5	22	17	6	8	8	0.52	0.15		21-22	T.	N.		
20	10	68	29	50	5	5	22	13	10	8	8	0.79	0.30		22		N. W.		
24	10	59	26	37	y	9	21	10	3	8	7	1.00	0.53		28-29	T.			
											1	1.06	1.06	12.00	12		S. W.		
18	<i>p</i>	61	27	59	18	5	12	14.8	8.2	8.0	5.3	1.73	1.62		12				
20	<i>p</i>	58	25	36	14	13	<i>bc</i>				4	1.88	1.10		16		W.		
19	<i>r</i>	61	28	47	16	5	12	12	8	11	6	1.41	0.50		16		S. W.		
22	10	62	27	47	5	8	7	15	9	7	4	1.59	1.10		12		N. E.		
20	<i>p</i>	63	32	59	18	18	11	18	2	11	6	1.45	0.61		12		W.		
18	30	59	27	44	17	15	23	13	10	8	3	2.08	1.62		12		N. E.		
18	10	62	27	46	4	9	22	14	12	5	8	1.34	0.49		12		W.		
18	30	60	25	41	4	8	22	17	8	6	6	2.38	1.02		16		W.		
22	31	57	20	40	<i>ab</i>	4	20	15.0	7.2	8.8	7.1	1.48	1.01		12				
35	31	50	16	28	5	5	20	14	5	12	9	1.69	1.01		12		N. E.		
37	31	49	15	27	17	4	20	14	7	10	10	0.72	0.24		12		N. E.		
32	30	58	19	36	16	5	25				4	0.70	0.35		24		E. N. E.		

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY		TEMPERA					
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily obser- vations.	Mean of maximum and minimum.	Highest.	Date.	
<i>Atl. Coast (Con.)</i>															
Brentwood	Suffolk	81	.....	.....	.....	.....	.....	.....	70	46	55.1	53.8	87	16
Setauket	"	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	56.0	86	16
Bedford	Westchester	290	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.1	89	16
Primrose	"	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.0	88	16
<i>Hudson Valley</i>															
Albany	Albany	97	30.18	30.71	3	29.69	28	1.02	80	43	.....	51.7	90	17
Cedar Hill	"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.0	88	16
Honeyroad Brook	Dutchess	450	.....	.....	.....	.....	.....	.....	.....	.....	50.0	50.3	84	16
Poughkeepsie	"	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	51.9	89	16
Wappingers Falls	Dutchess	110	.....	.....	.....	.....	.....	.....	.....	.....	.....	52.6	85	16
Catskill	Greene	450	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.2	88	16
West Point	Orange	167	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.0	90	17
Carmel	Washington	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	52.4	85	d
Greenwich	Putnam	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.3	83	16
<i>Mohawk Valley</i>															
Little Falls (1a)	Herkimer	924	.....	.....	.....	.....	.....	.....	.....	.....	.....	49.0	84	15
Canajoharie	Montgomery	300	.....	.....	.....	.....	.....	.....	.....	.....	50.0	50.4	83	16
St. Johnsville	"	810	.....	.....	.....	.....	.....	.....	.....	.....	.....	49.3	81	16
Rome	Oneida	445	.....	.....	.....	.....	.....	.....	.....	.....	.....	47.1	80	16
<i>Champlain Valley</i>															
Plattsburgh Bar'ks.	Clinton	125	.....	.....	.....	.....	.....	.....	.....	.....	.....	49.8	88	16
Ticonderoga	Essex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47.9	88	16
Glens Falls	Warren	340	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.6	81	b
Lake George	"	350	.....	.....	.....	.....	.....	.....	74	42	49.0	49.7	83	b
<i>St. Lawrence Valley</i>															
Alexandria Bay	Jefferson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	49.3	80	e
Madison Barracks	"	266	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.5	80	6
Watertown	"	486	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canton	St. Lawrence	304	48.5	47.6	79	15
North Hammond	"	300	49.0	49.6	76	f
Ogdensburg	"	258	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.4	79	15
Potsdam	"	300	47.5	48.4	80	15
<i>Great Lakes</i>															
Westfield	Chautauqua	758	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.2	86	15
Buffalo	Erie	768	30.11	30.58	3	29.64	11	0.94	67	42	.....	55.0	82	14
Pittsford	Monroe	502	.....	.....	.....	.....	.....	.....	.....	.....	.....	51.0	76	3
Rochester	"	523	30.12	30.60	3	29.61	12	0.99	72	41	52.2	52.2	85	15
Appleton	Niagara	301	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.0	80	15
Fort Niagara	"	263	.....	.....	.....	.....	.....	.....	.....	.....	.....	52.0	85	15
Baldwinsville	Onondaga	390	52.4	82.2	86	15
Ridgeway	Orleans	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.1	83	15
Oswego	Oswego	335	30.12	30.65	3	29.61	28	1.04	69	41	.....	52.0	81	15
Palermo	"	460	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.3	83	b
Lyons	Wayne	407	52.4	53.2	85	15
Erie, Pa.	Erie	714	30.12	30.57	3	29.62	11	0.95	69	44	.....	56.0	82	14

FOR OCTOBER, 1897 — (Continued).

TEMPERATURE — (IN DEGREES, FAHR.).							SKY.			PRECIPITATION — (INCHES).							Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	
22	31	65	25	40	<i>y</i>	10	25	19	2	10	6	1.50	0.60	<i>h. m.</i>	12		N. W.
36	31	50	15	31	11	5	22	18	6	7	6	1.79	1.00	.....	25		N. E.
24	31	65	24	40	4		<i>bd</i>	13	10	8	2	2.03	0.98	24.00	24		W.
25	31	63	25	40	<i>ac</i>	8	12	12	13	0	7	1.94	0.97	.....	25		.....
20	31	62	25	50	17	8	12	16.2	6.5	8.3	3.3	1.01	1.62	.....	13-14		.....
28	31	60	23	38	5	11	12	16	11	4	7	1.01	0.70	.....	12		S.
							22	3	6		3	0.95	0.85	.....	12		S.
24	31	60	22	35	5	8	12	11	10	10	3	0.93	0.88	0.55	12		N. E.
26	31	67	28	46	5	9	12	14	4	13	2	0.13	0.10	5.00	12		N. W.
26	31	59	24	35	5	10	12	18	5	8	5	1.24	1.12	.....	11-12		W.
27	31	61	22	36	5	8	12	10	13	8	1	0.81	0.81	.....	12		N. N. W.
20	31	70	30	50	17	15	<i>bs</i>				3	1.43	1.05	.....	12		W.
24	31	61	24	40	5	12	<i>bf</i>	19	1	11	2	0.89	0.54	16.00	12		.....
22	30	61	24	39	17	12	9	20	5	6	4	1.73	1.62	.....	13-14		S. W.
24	<i>s</i>	56	22	48	15	8	22	21.3	1.7	8.0	3.5	0.84	0.56	.....	12		.....
24	29	60	24	48	15	9	11	20	1	10	4	1.31	0.47	10.00	12		E.
30	<i>p</i>	53	21	33	5	9	22	25	0	6	3	0.74	0.48	.....	12		W.
24	<i>t</i>	57	23	40	5	8	22	19	4	8	4	0.93	0.56	.....	12		W.
25	9	55	22	44	16	12	22				3	0.38	0.22	.....	12		.....
23	<i>m</i>	59	24	50	18	6	29	18.3	6.0	6.7	4.8	1.46	1.92	8.00	12		.....
25	31	63	25	40	17	12	31				4	0.52	0.22	.....	29		S. W.
26	10	55	23	37	17	9	12	24	2	5	5	2.19	1.92	8.00	12		S.
23	<i>m</i>	60	26	56	18	6	29	15	10	6	2	1.52	1.41	.....	11-12		S. E.
25	31	59	23	33	17	10	7	16	6	9	8	1.59	1.31	23.30	12		S.
17	<i>u</i>	58	25	43	11	8	12	11.0	12.8	7.2	5.0	0.79	0.39	16.00	12		.....
21	<i>v</i>	59	27	39	17	12	16				5	0.80	0.39	16.00	12		S. W. S. E.
17	<i>u</i>	62	27	43	11	13	7	11	13	7	3	0.64	0.31	1.00	28		S. W.
20	30	56	22	40	<i>z</i>	8	12	7	17	7	6	0.78	0.26	.....	22		S.
25	30	54	23	36	11	11	7	10	17	4	5	1.19	0.15	13.00	22		S. W.
19	30	61	27	39	11	12	22	16	4	11	6	0.55	0.25	.....	12		S. W.
24	<i>k</i>	53	20	40	<i>ad</i>	3	21	12.6	10.8	7.6	6.2	0.91	0.93	.....	20		.....
30	30	52	21	35	3	10	<i>bg</i>	18	6	7	3	1.72	0.93	.....	20		S. E.
33	<i>p</i>	43	17	33	3	7	7	6	14	11	8	0.80	0.37	.....	12		S. W.
28	10	57	24	40	<i>ad</i>	6	21	9	10	12	6	0.97	0.34	.....	20		S. W.
31	10	55	22	38	14	3	21	8	11	12	8	0.97	0.34	.....	20		T. S. W.
29	<i>h</i>	56	20	40	14	7	21	11	7	13	9	1.05	0.39	.....	20-21		S. W.
32	30	53	21	40	14	8	25				3	1.05	0.40	.....	12		N.
30	<i>k</i>	56	24	37	4	11	<i>ag</i>	19	6	6	3	0.65	0.38	.....	12		.....
31	<i>h</i>	52	21	36	14	10	20	11	19	1	9	1.07	0.42	20.00	20-21		E.
31	10	50	18	34	14	6	21	14	8	9	8	0.51	0.19	.....	12		S. E.
24	<i>k</i>	59	22	35	4	7	<i>bh</i>	20	7	4	6	0.40	0.18	.....	12		S. E.
32	10	53	20	34	4	5	21	10	19	2	7	0.48	0.18	.....	12		S. E.
35	18	47	16	29	16	4	29	13	12	6	5	1.24	0.80	.....	12		S.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA.				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri daily obser- vations	Mean of maximum and minimum.	Highest.	Date.
<i>Central Lakes.</i>												53.4	88	15
Auburn.....	Cayuga.....											53.3	86	15
Fleming.....	".....	1000									54.7	54.5	85	15
Watkins.....	Schuyler.....								80	46		53.6	88	15
Romulus.....	Seneca.....	719							78	42		53.4	87	15
Ithaca.....	Tompkins.....	310	30.13	30.74	3	29 65 28	1.00		74	44	51.3	52.1	84	16
Penn Yan.....	Yates.....											53.3	88	15
Mean.....			30.14	30.74	3	29 61	a 1.00		73	42		51.0	90	g

* Mean of the tri-daily observations. † Mean of the Max. and Min. by the Draper Thermo tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m.) ÷ 4, four hours. (1) Voluntary Observer. (2) U. S. Weather Bureau. (1a) City Reservoir.

(a) 12, 28; (b) 15, 16; (c) 1, 14; (d) 1, 16; (e) 6, 15; (f) 5, 14, 15, 16; (g) 1, 17; (h) 10, 18; (j) 8, 18; (v) 8, 30, 31; (w) 10, 18, 31; (x) 8, 10, 18, 30; (y) 4, 5; (z) 5, 14; (aa) 5, 6; (ab) 1, 4, 5, 10; (ac) 1, 10; (be) 19, 21; (bf) 12, 21; (bg) 20, 21; (bh) 6, 31.

FOR OCTOBER, 1897—*Concluded.*

TURE — (IN DEGREES FAHR.).								SKY.				PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.		
26	10	57	22	43	<i>ae</i>	4	22	13	12	8	9	6	0.80	0.31	<i>h. m.</i> 6.15	7	.....
29	8	57	25	37	<i>af</i>	9	21	18	7	6	6	0.75	0.26	3.00	12	.....	<i>S.</i>
33	<i>w</i>	52	19	33	17	6	21	12	12	7	3	0.80	0.39	1.00	12	.....	<i>S.</i>
26	10	62	23	42	14	4	22	13	6	12	7	0.52	0.22	0.55	28	T	<i>S. E.</i>	
32	<i>x</i>	55	23	43	15	7	21	14	8	9	6	1.21	0.31	6.15	7	.....	<i>S.</i>
28	<i>h</i>	56	20	34	14	4	22	12	11	8	7	0.88	0.27	1.20	28	T.	<i>S. E.</i>	
30	10	58	22	43	14	6	22	10	9	12	7	0.62	0.24	1.00	28	T.	<i>S. W.</i>	
17	<i>u</i>	58	24	59	18	3	21	15.2	7.9	7.9	5	1.06	1.02	8.00	12	T	<i>S. W.</i>	

graph. || Report received too late to be used in computing means. The means from the
 † Blank indicates that the duration is not shown in the original records, but is within twenty-
 (2a) Intake Conduit, nine miles north of city.

(*k*) 8, 10; (*m*) 10, 31; (*n*) 8, 18, 31; (*p*) 10, 30; (*r*) 9, 29; (*s*) 10, 29, 30, 31; (*t*) 10, 30, 31; (*u*) 30, 31;
 (*ad*) 4, 14; (*ae*) 14, 15; (*af*) 14, 27; (*ag*) 21, 22; (*ah*) 6, 21, 22; (*bb*) 9, 12; (*bc*) 22, 30; (*bl*) 12, 25;

TEMPERATURE—OCTOBER, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	62	53	50	52	56	51	44	45	45	43	66	60	50	60
Alfred	80	59	66	74	72	57	45	59	58	58	62	70	62	78
Angelica	39	39	33	36	41	46	33	28	29	24	46	47	35	50
Bolivar	39	40	30	25	28	50	41	34	32	23	47	58	35	35
Franklinville	79	62	66	71	74	53	48	62	61	61	67	70	63	78
Humphrey	38	40	27	21	24	42	37	30	30	20	46	43	31	32
Lockport	82	64	71	76	78	64	48	61	60	69	69	69	63	80
Victor	37	39	31	26	29	46	41	28	40	19	47	56	30	36
Wedge	79	61	68	79	77	62	47	60	59	60	66	70	65	80
Arkwright	47	46	38	36	45	45	34	27	35	28	46	51	37	47
Jamestown	79	67	68	73	73	61	59	59	51	64	72	67	61	79
Elmira	44	48	38	33	41	49	39	31	38	27	51	54	37	42
Avon	79	65	69	70	75	66	59	65	59	67	67	74	66	69
Lockport	47	45	30	29	33	50	42	35	38	30	49	57	45	38
Victor	83	67	63	69	78	67	59	59	54	56	60	68	73	83
Wedge	45	40	29	31	36	50	28	31	36	34	38	36	36	35
Wedge	78	67	67	69	76	59	50	62	50	56	78	66	58	78
Wedge	56	48	37	39	45	48	38	83	34	30	42	47	40	44
Wedge	86	64	67	77	76	65	51	62	55	59	64	75	66	80
Wedge	56	42	34	35	46	46	37	32	32	27	45	52	41	42
Wedge	80	59	66	71	76	64	51	60	57	60	64	73	65	80
Wedge	42	41	30	27	31	46	41	33	35	24	47	53	29	35
Wedge	79	59	65	73	75	60	55	60	57	57	65	71	63	80
Wedge	41	37	29	34	35	48	39	27	29	20	45	46	32	37
Wedge	79	60	67	71	74	63	48	58	60	58	68	67	58	78
Wedge	47	44	35	34	45	42	32	26	27	26	48	46	34	40
<i>Eastern Plateau...</i>	63	53	46	49	53	56	48	44	46	40	55	63	51	54
Binghamton (1)	79	68	69	75	75	66	56	60	55	59	68	72	62	75
Binghamton (2)	47	43	27	27	32	50	41	27	33	24	45	50	40	39
Oxford	81	62	66	73	75	65	50	59	57	59	70	71	62	76
Cortland	50	39	29	29	31	50	38	28	31	25	49	53	42	36
South Kortright ...	78	68	65	68	73	67	56	57	55	58	67	68	63	73
Bouckville	43	43	25	25	26	39	42	24	36	29	40	55	35	31
Middletown	79	77	64	70	73	73	64	58	59	56	67	68	71	73
Port Jervis	46	51	32	30	32	52	47	29	49	26	46	62	39	39
Cooperstown	76	57	62	66	75	65	53	56	53	54	66	67	68	72
Garrattsville	41	38	22	23	30	47	41	29	31	18	41	57	35	29
New Lisbon	73	61	60	68	70	65	57	59	55	57	61	69	62	71
Oneonta	51	48	31	35	40	49	42	25	44	25	41	59	39	38
Perry City	80	66	59	66	71	65	60	60	55	68	69	68	68	68
Straits Corners	58	45	34	36	42	45	45	36	40	38	38	62	45	42
Waverly	79	59	60	66	70	65	59	59	60	56	70	69	68	67
Dryden	45	50	30	30	32	37	36	35	37	26	42	62	42	38
Mohonk Lake	76	58	59	63	70	62	53	53	50	52	66	68	58	68
Alfred	50	40	30	30	33	48	39	30	33	25	40	54	40	35
Garrattsville	71	60	61	66	70	63	53	55	52	51	66	67	60	69
New Lisbon	47	44	30	31	33	48	39	26	40	23	45	55	41	37
Oneonta	78	61	63	68	73	64	50	55	53	55	67	78	61	71
Perry City	42	25	23	23	24	44	37	25	28	18	43	55	36	31
Straits Corners	78	62	69	70	73	65	55	60	56	60	69	70	66	72
Waverly	45	41	28	29	30	49	40	29	35	24	45	50	41	32
Dryden	80	63	60	67	72	62	48	58	56	46	67	71	59	77
Mohonk Lake	50	36	28	31	36	48	40	36	28	22	42	56	35	33
Alfred	80	60	62	70	72	68	51	68	57	57	66	71	67	76
Garrattsville	45	43	27	27	29	40	40	26	32	21	43	55	37	35
New Lisbon	85	64	69	68	76	70	62	64	60	63	68	75	71	80
Oneonta	45	40	28	27	26	46	41	29	32	20	45	55	38	34
Perry City	78	60	61	68	72	62	55	57	59	57	69	69	58	74
Straits Corners	46	38	28	31	35	49	35	27	28	24	46	53	36	40

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
70	68	46	43	49	52	51	49	49	47	48	51	52	55	45	37	46	51.3
82	80	54	60	64	55	54	52	56	62	54	67	71	68	53	40	56	50.1
59	54	30	24	38	44	42	40	37	32	38	37	36	46	33	29	31	51.0
82	81	75	57	64	59	57	54	59	60	55	65	68	69	56	49	58	51.0
52	58	38	21	34	44	50	44	39	30	35	37	32	37	37	32	31	49.2
83	83	62	60	65	60	59	50	60	61	55	67	69	68	57	44	66	50.4
44	50	23	18	29	40	41	41	35	29	32	32	29	35	34	21	25	52.4
83	82	58	57	63	59	56	54	61	62	60	66	72	70	56	42	58	52.8
52	58	36	19	32	40	50	43	35	28	30	33	32	36	36	26	30	51.2
82	80	57	60	62	57	55	54	61	69	61	71	72	67	56	41	57	53.6
63	52	34	27	41	47	47	43	41	34	38	40	41	44	33	28	33	51.8
82	81	51	57	61	60	59	51	59	60	56	67	69	69	59	45	61	51.8
60	57	36	25	40	48	50	45	34	31	37	37	34	47	37	31	34	51.8
85	86	58	67	68	60	55	53	64	60	60	62	65	67	51	50	60	51.8
53	57	40	27	35	52	45	45	49	45	46	43	56	40	39	34	46	51.8
84	86	75	68	61	61	56	58	63	60	58	62	64	70	67	47	60	51.8
62	74	38	24	32	40	42	43	41	32	38	34	40	36	31	29	39	51.8
80	79	46	55	62	61	58	60	57	58	55	59	59	64	45	49	64	51.8
63	48	34	21	42	47	48	45	38	40	46	40	44	33	33	38	38	51.8
86	71	55	59	59	60	52	57	60	57	56	60	65	72	56	44	62	51.8
69	39	34	29	35	45	47	40	33	36	45	49	34	42	35	30	33	51.8
87	85	56	65	66	55	50	50	61	60	57	63	69	70	55	50	56	51.8
58	55	31	27	39	46	42	43	39	38	44	40	41	45	33	26	36	51.8
86	85	64	60	62	59	55	54	58	61	59	66	67	69	55	46	57	51.8
51	52	34	24	33	44	45	45	42	35	43	39	36	27	27	34	32	51.8
83	84	60	60	65	56	56	54	57	60	58	65	68	70	53	45	57	51.8
51	56	27	22	30	42	44	42	36	27	35	34	29	37	34	27	29	51.8
80	79	54	57	63	60	54	56	58	59	55	59	67	69	56	43	59	51.8
62	52	30	34	37	47	46	44	36	33	35	40	38	46	31	29	30	51.8
68	70	49	41	47	48	50	47	47	44	51	50	49	52	47	37	41	51.8
83	85	65	58	64	55	55	50	63	58	65	67	68	65	55	42	57	51.8
53	53	35	26	32	43	45	45	38	31	38	33	32	44	37	30	30	51.8
85	87	57	61	61	55	55	50	62	58	64	66	68	67	48	40	57	51.8
57	57	34	27	35	44	47	45	40	31	43	34	32	43	38	31	30	51.8
83	82	74	57	60	56	60	52	60	67	63	66	65	65	58	47	55	51.8
45	49	35	21	27	33	41	41	31	26	38	30	27	32	35	27	21	51.8
83	84	83	56	60	58	55	53	60	59	63	69	66	66	66	44	55	51.8
53	55	40	24	32	39	40	45	35	28	42	34	31	42	40	30	30	51.8
78	79	72	72	60	56	58	57	56	51	60	60	65	64	59	41	52	51.8
50	51	32	20	28	32	40	41	29	25	37	35	26	29	39	26	18	51.8
81	81	49	57	59	61	62	57	61	59	62	64	66	62	60	42	52	51.8
56	62	34	25	35	38	42	43	33	32	35	36	34	43	35	29	25	51.8
83	86	73	56	62	55	52	50	52	60	63	65	63	63	59	54	50	51.8
45	60	39	32	40	40	43	42	33	49	45	45	45	42	40	35	35	51.8
83	86	60	58	63	56	57	59	56	54	60	63	64	67	54	46	55	51.8
42	55	45	30	45	45	48	44	41	30	51	46	40	38	48	33	25	51.8
79	80	63	52	55	56	54	52	54	55	58	58	64	63	53	40	52	51.8
55	63	34	26	32	36	44	45	34	30	42	39	31	38	33	29	26	51.8
79	80	74	55	51	59	57	54	56	58	63	62	64	65	54	42	53	51.8
51	53	29	23	33	39	42	35	34	32	42	41	35	43	30	28	25	51.8
82	82	60	55	56	56	60	50	59	59	65	63	66	64	54	41	53	51.8
58	55	29	19	27	33	42	40	33	25	37	28	25	33	27	23	20	51.8
82	82	60	59	60	57	62	57	61	59	62	65	66	66	56	44	56	51.8
54	57	35	25	31	35	44	45	40	30	38	32	31	35	34	28	24	51.8
85	84	56	56	60	58	50	51	58	58	59	60	62	68	56	42	56	51.8
58	56	28	23	33	40	45	40	36	28	37	36	30	37	34	27	30	51.8
84	86	74	58	62	56	50	48	62	62	56	65	65	64	65	43	55	51.8
51	55	32	21	31	42	42	43	39	29	43	34	30	33	35	27	27	51.8
87	88	60	62	66	59	52	50	64	61	61	69	70	70	55	52	57	51.8
52	52	33	22	35	43	40	45	41	33	43	40	34	38	28	30	28	51.8
83	83	58	55	62	56	54	52	59	59	61	63	68	57	41	55	55	51.8
60	58	28	25	36	43	45	36	36	31	39	35	32	45	36	30	34	51.8
82	81	51	57	61	60	59	51	59	60	56	67	69	69	59	45	61	51.8
60	57	36	25	40	48	50	45	34	31	37	37	34	47	37	31	34	51.8
85	86	58	67	68	60	55	53	64	60	60	62	65	67	51	50	60	51.8
53	57	40	27	35	52	45	45	49	45	46	43	56	40	39	34	46	51.8
84	86	75	68	61	61	56	58	63	60	58	62	64	70	67	47	60	51.8
62	74	38	24	32	40	42	43	41	32	38	34	40	36	31	29	39	51.8
80	79	46	55	62	61	58	60	57	58	55	59	59	64	45	49	64	51.8
63	48	34	21	42	47	48	45	38	40	46	40	44	33	33	38	38	51.8
86	71	55	59	59	60	52	57	60	57	56	60	65	72	56	44	62	51.8
69	39	34	29	35	45	47	40	33	36	45	49	34	42	35	30	33	51.8
87	85	56	65	66	55	50	50	61	60	57	63	69	70	55	50	56	51.8
58	55	31	27	39	46	42	43	39	38	44	40	41	45	33	26	36	51.8
86	85	64	60	62	59	55	54	58	61	59	66	67	69	55	46	57	51.8
51	52	34	24	33	44	45	45	42	35	43	39	36	27	27	34	32	51.8
83	84	60	60	65	56	56	54	57	60	58	65	68	70	53	45	57	51.8
51	56	27	22	30	42	44	42	36	27	35	34	29	37	34	27	29	51.8
80	79	54	57	63	60	54	56	58	59	55	59	67	69	56	43	59	51.8
62	52	30	34	37	47	46	44	36	33	35	40	38	46	31	29	30	51.8
68	70	49	41	47	48	50	47	47	44	51	50	49	52	47	37	41	51.8
83	85	65	58	64	55	55	50	63	58	65	67	68	65	55	42	57	51.8
53	53	35	26	32	43	45	45	38	31	38	33	32	44	37	30	30	51.8
85	87	57	61	61	55	55	50	62	58	64	66	68	67	48	40	57	51.8
57	57	34	27	35	44	47	45	40	31	43	34	32	43	38	31	30	51.8
83	82	74	57	60	56	60	52	60	67	63	66	65	65	58	47	55	51.8
45	49	35	21	27	33	41	41	31	26	38	30	27	32	35	27	21	51.8
83	84	83	56	60	58	55	53	60	59	63	69	66	66	66	44	55	51.8
53	55	40	24	32	39	40	45	35	28	42	34	31	42	40	30	30	51.8
78	79	72	72	60	56	58	57	56	51	60	60	65	64	59	41	52	51.8
50	51	32	20	28	32	40	41	29	25	37	35	26	29	39	26	18	51.8

TEMPERATURE—OCTOBER, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau.</i>	58	52	47	50	53	53	47	38	41	37	50	57	49	49
Lake Placid.....	70	62	60	68	72	72	66	49	54	45	63	56	62	68
Saranac Lake.....	40	30	32	42	37	41	38	28	28	29	46	35	37	32
Gloversville.....	72	61	70	75	76	62	46	50	45	53	67	65	70	76
	31	27	29	32	43	40	27	32	19	29	53	60	30	30
	80	60	65	71	76	66	53	55	54	54	67	65	64	63
Little Falls (2)....	55	40	30	27	29	35	45	30	34	22	34	55	41	32
	69	73	60	60	67	70	63	53	59	61	51	66	68	66
	36	46	26	25	26	28	44	25	25	20	33	15	33	30
North L. k.....	72	72	64	64	70	71	58	42	51	46	51	65	63	52
	39	45	30	30	32	35	40	25	30	23	25	49	34	33
Lowville.....	72	66	69	75	76	64	52	56	54	51	69	68	60	73
	59	34	25	29	32	52	39	29	38	18	39	56	37	31
Number Four.....	79	61	63	70	71	62	46	50	51	5	67	64	55	70
	45	49	30	29	34	47	36	22	23	21	38	50	35	32
<i>Atlantic Coast.</i>	60	56	51	54	56	57	57	52	56	48	57	66	62	57
Brooklyn.....	85	60	63	71	73	69	67	61	68	59	70	72	72	67
	58	50	44	44	45	53	52	45	52	38	46	63	57	50
New York City....	83	68	58	68	71	68	66	61	65	57	66	69	71	66
	61	47	44	48	51	51	51	44	44	42	50	62	59	54
Willels Point.....	90	63	65	73	73	68	67	63	68	66	69	70	71	69
	56	44	41	40	47	52	44	45	41	46	60	55	47	49
Brentwood.....	83	62	65	71	70	64	69	62	67	59	72	71	77	69
	50	41	39	31	30	34	50	37	45	30	40	60	44	45
Setauket.....	82	69	58	65	69	67	64	59	68	52	74	72	68	66
	55	49	47	41	45	50	52	48	59	45	43	62	58	51
Bedford.....	82	68	62	70	71	64	64	59	64	55	67	69	68	68
	48	48	31	30	32	49	43	39	47	29	36	62	51	39
Primrose.....	86	68	63	65	72	67	66	62	67	69	70	71	72	70
	46	45	34	32	33	42	38	42	40	29	36	63	49	38
<i>Hudson Valley.</i>	65	55	47	49	53	54	52	49	50	41	53	64	56	54
Albany.....	83	67	65	71	74	65	58	59	58	55	69	72	66	69
	54	43	26	36	36	49	46	41	40	32	46	61	49	41
Honey mead Brook.	79	59	59	65	69	63	59	54	60	53	66	71	63	66
	48	39	39	31	34	44	41	37	10	28	39	63	45	38
Poultkeepsie.....	86	63	63	64	76	68	62	61	66	58	69	70	68	70
	16	37	29	31	30	41	39	36	35	24	36	61	42	36
Wappingers Falls..	82	66	66	65	70	65	62	60	60	55	70	71	70	71
	50	43	33	38	35	42	42	40	35	29	40	61	50	40
Catskill.....	81	62	63	68	73	65	58	59	63	56	64	69	68	68
	52	48	34	33	37	48	47	40	44	31	43	61	51	41
West Point.....	76	85	62	60	70	70	65	65	62	65	58	68	72	70
	38	45	30	30	30	30	38	33	34	27	39	44	42	36
Carmel.....	85	65	61	68	74	65	64	63	61	60	66	68	70	72
	51	47	32	32	34	40	43	38	40	29	42	56	38	40
Greenwich.....	76	64	60	64	71	64	63	53	58	59	70	72	62	64
	53	49	32	32	35	40	44	39	46	24	35	57	44	38
<i>Mohawk Valley.</i>	60	52	49	51	57	54	44	43	48	41	59	60	50	53
Little Falls (1a)...	74	60	63	74	76	65	50	56	53	58	69	69	61	67
	50	31	53	40	49	46	26	32	25	33	60	45	38	44
Canajoharie.....	74	68	61	67	70	64	55	55	55	45	62	70	60	65
	47	59	39	35	37	41	45	34	40	30	43	58	44	39
St. Johnsville.....	73	65	61	67	72	68	55	53	53	51	69	69	60	66
	51	50	31	30	32	46	44	29	42	24	41	58	45	35
Rome.....	69	60	57	62	67	63	48	54	52	52	77	70	58	66
	41	31	30	37	49	45	20	31	25	35	50	38	37	40
<i>Champlain Valley.</i>	60	53	48	49	52	57	51	45	48	39	49	59	54	51
Plattsburgh Barracks	70	72	59	64	67	70	67	48	53	51	44	68	67	62
	41	40	35	35	32	38	37	32	35	29	29	35	44	38
Ticonderoga.....	73	60	65	68	71	69	63	55	57	50	68	70	63	68
	53	39	33	33	39	47	45	38	47	26	32	61	43	36
Glens Falls.....	76	65	61	64	70	68	51	54	60	50	71	65	61	66
	43	40	30	27	30	46	43	38	37	23	32	53	43	36
Lake George.....	74	65	65	65	69	68	55	53	63	54	68	68	67	64
	49	41	33	33	38	48	45	38	33	28	46	54	44	38

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
65	67	48	40	43	46	47	45	44	45	48	50	50	51	45	30	35	47.7
78	77	52	51	58	56	52	50	58	.....	58	61	67	65	59	33	47	47.3
63	63	26	23	32	36	32	37	35	.....	33	34	34	40	32	20	21	
82	80	43	52	61	63	60	51	63	63	62	63	71	67	42	38	50	47.2
61	33	23	31	31	38	31	34	20	29	29	29	34	36	19	21	29	
84	84	68	58	57	54	60	48	59	58	65	66	65	64	55	45	50	
48	60	35	25	30	35	42	38	30	29	39	36	31	33	34	23	23	49.0
75	83	82	81	55	58	53	60	50	64	65	66	70	70	72	47	42	47.6
32	52	34	22	23	33	32	40	30	22	32	34	35	36	38	20	21	
69	77	76	42	52	60	56	55	45	60	53	64	68	67	62	42	33	45.9
34	49	32	23	28	33	40	39	30	31	31	34	39	31	35	18	22	
80	79	73	55	58	57	60	51	61	61	61	65	68	65	57	41	53	49.4
60	65	33	23	31	30	43	42	31	29	35	33	39	39	35	20	23	
78	75	57	51	58	58	57	47	58	60	65	67	67	65	55	35	50	47.4
59	57	29	22	31	39	41	39	32	31	33	37	32	41	28	18	22	
66	73	55	47	51	54	54	49	50	47	52	58	55	57	52	43	43	55.0
82	85	59	58	62	60	61	55	56	52	57	63	63	64	58	51	54	56.8
56	64	52	39	47	55	51	45	45	45	43	53	47	58	50	40	25	
80	86	71	56	60	58	59	52	54	52	57	62	60	65	58	50	52	56.0
56	66	44	40	44	54	50	46	47	46	50	53	49	52	42	38	37	
83	89	58	60	63	59	60	55	57	55	58	65	62	61	58	55	56	56.0
54	53	41	40	43	51	46	47	44	47	53	49	49	53	29	32	33	
75	87	61	61	62	60	60	58	65	58	60	70	71	70	59	51	59	53.8
44	60	44	35	34	43	43	38	35	35	50	50	46	51	46	32	22	
77	86	73	56	62	59	56	52	54	54	57	61	58	58	50	51	54	56.0
54	64	48	43	44	50	50	47	43	42	48	52	48	52	48	39	36	
83	89	75	58	64	58	64	53	62	52	54	71	74	65	60	51	56	53.1
49	54	37	29	34	44	46	42	29	30	47	49	39	45	46	31	24	
83	88	58	59	64	57	61	56	57	59	55	66	65	65	58	51	59	53.0
46	55	48	28	32	44	49	41	39	33	45	47	35	42	49	31	25	
66	72	55	44	50	49	52	48	49	44	52	52	51	52	49	38	38	51.7
86	88	60	58	58	58	61	57	62	56	62	66	67	67	58	47	53	53.0
55	60	39	34	39	40	45	42	27	34	45	39	35	38	35	31	28	
80	84	52	52	60	57	56	54	56	55	62	65	66	65	53	43	53	50.3
53	57	40	29	34	42	46	42	38	32	47	39	36	38	27	28	24	
87	89	75	63	65	56	59	57	61	55	65	68	71	67	59	46	55	51.9
51	55	46	26	34	41	41	39	38	39	47	41	36	36	31	26	22	
80	85	72	58	68	58	62	58	62	55	58	66	64	67	60	50	48	52.6
50	64	40	30	33	40	44	40	42	32	40	44	40	40	41	32	26	
84	88	75	57	61	56	59	54	62	53	63	67	67	65	63	48	53	53.2
54	62	41	33	36	41	47	45	37	33	47	43	38	38	40	31	27	
70	85	90	58	60	65	60	59	59	60	56	56	65	65	64	58	45	50.0
38	44	40	25	45	34	45	38	35	30	32	32	32	36	40	29	20	
84	85	53	59	66	61	58	56	60	55	65	68	65	63	55	46	51	52.4
51	58	31	34	26	47	46	43	41	38	43	39	42	45	41	33	24	
80	83	79	54	58	57	58	50	56	55	60	62	62	64	60	43	51	50.3
52	63	40	26	38	37	40	36	32	30	42	35	34	32	42	22	23	
65	65	46	41	45	48	49	45	44	44	47	49	49	50	41	35	40	49.0
84	83	46	57	56	52	53	49	58	57	66	67	62	63	46	42	49	49.0
36	36	27	29	29	39	41	35	33	33	32	39	42	39	24	26	30	
81	83	69	51	57	55	58	55	58	54	60	60	60	60	60	43	50	50.4
52	57	39	31	36	41	46	46	33	33	40	36	35	39	33	30	32	
80	81	73	54	56	54	55	50	57	55	58	62	61	63	61	43	50	49.3
50	61	38	26	32	36	38	42	31	30	37	34	32	37	37	24	24	
78	80	47	50	55	54	56	47	55	58	55	58	60	60	43	42	52	47.1
59	36	27	30	38	41	43	35	30	25	30	35	38	38	26	28	32	
63	70	57	45	47	46	46	45	46	46	50	50	49	49	48	38	35	49.8
66	88	78	69	58	57	57	56	54	57	57	57	58	63	60	47	37	47.9
38	58	38	31	30	35	35	34	32	32	37	35	36	35	37	27	25	
81	81	80	57	60	53	50	53	59	59	57	59	66	65	63	46	49	50.6
50	59	49	29	35	25	34	37	33	32	40	46	35	37	45	28	24	
83	83	70	75	60	56	58	53	58	58	64	64	64	63	49	52	49	49.7
51	60	37	25	25	25	38	35	33	33	41	36	32	32	43	34	23	
83	84	73	55	60	56	60	51	60	61	64	63	66	61	52	47	49	51.6
51	60	40	28	37	39	39	39	35	35	41	41	35	38	37	26	25	

TEMPERATURE — OCTOBER, 1897, SHOWING DAILY MEANS
STATIONS.—

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Val.</i> ..	59	53	50	54	57	56	41	39	41	38	52	60	56	57
Madison Barracks..	74	76	64	70	72	80	60	49	59	48	57	75	72	67
	51	40	35	26	43	54	39	21	36	22	33	53	48	33
Canton	70	69	67	72	76	62	47	55	53	41	73	72	67	76
	49	36	29	36	46	47	34	23	27	20	30	48	42	50
North Hammond...	72	60	66	70	76	62	56	50	50	48	70	68	64	76
	54	42	31	36	36	48	40	28	32	34	42	60	40	36
Ogdensburg	74	60	62	67	72	68	45	54	58	45	72	75	63	74
	54	40	37	42	46	40	34	20	26	30	36	52	46	40
Potsdam	61	67	70	73	63	62	48	53	58	55	72	67	75	78
	34	37	38	39	43	34	35	27	28	29	33	34	38	43
<i>Great Lakes</i>	67	57	53	55	62	59	47	47	49	44	60	62	51	62
Westfield	81	68	72	69	78	70	57	63	65	57	78	69	58	82
	54	46	37	40	50	52	40	39	35	33	57	53	40	50
Buffalo	75	65	76	68	74	67	51	64	58	57	74	70	62	75
	57	49	43	45	57	51	44	40	39	33	57	54	47	48
Pittsford	80	66	68	73	80	67	50	59	60	55	72	72	60	82
	52	46	31	33	46	51	40	32	34	28	41	50	41	42
Rochester	80	66	72	78	81	66	50	60	55	56	71	71	63	83
	59	49	42	42	49	50	39	33	34	31	48	52	43	45
Appleton	76	63	60	65	77	68	55	60	58	54	79	70	58	79
	57	52	32	36	44	54	39	32	37	29	41	57	38	39
Fort Niagara.	80	65	68	71	77	73	56	60	62	63	77	71	60	80
	60	50	36	42	53	54	46	38	50	33	41	56	40	40
Baldwinsville.....	71	65	66	73	76	63	54	58	60	60	72	71	61	74
	60	42	35	36	40	51	38	30	39	30	42	50	44	40
Ridgeway	79	74	68	73	77	70	55	59	58	56	74	70	61	78
	61	50	35	42	47	53	42	35	42	31	40	58	42	42
Oswego.....	71	65	66	69	78	63	53	58	59	54	69	71	57	77
	57	47	39	40	46	53	37	34	45	31	47	56	48	43
Palermo	71	63	62	69	75	60	50	56	56	54	73	73	58	74
	48	43	34	34	41	53	38	24	32	24	43	51	38	47
Lyons	79	66	65	70	76	62	53	59	58	55	69	70	61	77
	59	47	48	36	45	53	38	35	38	32	48	53	45	44
Erie, Pennsylvania.	80	65	70	71	78	67	53	70	61	57	76	66	58	82
	59	50	44	44	52	52	43	39	40	36	56	55	44	57
<i>Central Lakes</i>	69	56	50	55	60	58	49	46	47	44	58	53	52	59
Auburn.....	79	69	67	75	76	61	50	62	59	62	70	70	65	77
	52	44	33	39	42	59	39	29	31	30	45	54	41	40
Fleming	77	63	66	73	77	65	56	60	59	55	70	70	62	75
	66	50	39	43	49	54	42	34	38	33	49	60	46	45
Watkins.....	86	64	65	72	78	67	66	62	58	57	68	76	62	82
	54	47	32	35	39	50	44	34	40	26	46	56	41	40
Romulus.....	82	64	65	71	76	65	57	59	58	58	67	71	63	74
	58	49	35	38	45	55	43	32	35	32	45	45	43	42
Ithaca	79	63	61	70	73	63	52	59	59	56	68	72	59	75
	52	45	36	37	44	52	41	31	35	28	50	56	42	41
Penn Yan.....	84	65	67	74	78	63	54	60	58	57	66	74	64	82
	59	48	33	38	43	51	44	31	35	30	51	57	40	39
Mean	63	54	49	52	56	56	48	45	47	42	56	61	53	56

† Max. and Min. by the Draper Thermograph. || Received too late to be used in computing conduit, nine miles north of city.

FOR THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
(Concluded).

15	1	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
66	66	46	41	47	47	47	47	48	47	48	48	50	53	42	31	37	49.3
75	73	75	52	59	62	68	62	52	62	69	58	69	69	66	48	46	50.5
39	61	36	26	39	31	38	42	39	33	34	35	32	42	36	21	21	
79	76	50	56	62	56	53	52	61	62	59	60	67	66	46	40	49	47.6
65	50	27	23	30	36	30	35	51	29	39	28	32	36	21	17	17	
76	76	46	56	62	60	56	56	60	58	56	60	60	62	48	46	46	49.6
60	66	36	25	40	36	36	40	31	34	40	36	31	36	36	20	32	
79	78	60	58	64	56	57	52	57	62	60	67	65	63	51	42	51	50.4
64	49	36	32	29	38	41	40	38	36	37	38	40	45	29	25	30	
80	74	60	55	58	57	56	52	55	59	60	64	67	63	54	36	55	
45	52	33	27	37	34	37	40	34	33	32	34	40	46	28	19	25	48.4
74	67	47	44	50	52	53	52	48	48	50	49	51	56	45	40	50	53.2
81	81	63	55	63	62	60	58	60	57	55	58	65	70	59	52	65	55.0
70	58	35	34	45	53	50	46	40	40	39	36	42	53	40	30	43	
74	74	48	58	62	62	59	59	61	57	58	62	70	65	47	43	62	54.0
66	48	38	35	50	50	50	46	40	44	43	41	47	47	34	33	44	
85	84	54	57	59	61	54	59	60	57	55	61	67	71	52	45	65	52.2
65	51	35	30	35	42	48	48	34	35	44	39	31	45	33	32	35	
86	82	49	57	60	61	53	59	61	59	55	62	70	71	46	46	63	54.0
66	49	34	31	41	45	50	46	37	39	46	39	36	46	35	23	40	
85	80	55	54	57	58	58	59	55	55	55	56	53	66	52	47	62	52.2
64	55	42	29	36	48	51	47	37	40	45	36	35	37	38	35	35	
85	80	78	56	58	58	60	62	56	55	55	58	52	67	61	44	62	54.2
60	55	40	35	37	38	50	48	26	41	47	41	34	38	40	32	37	
86	85	51	57	58	58	57	55	61	61	62	63	65	69	60	46	57	52.2
64	53	37	32	36	40	46	44	35	33	40	37	34	42	36	32	34	
83	79	56	55	60	57	56	58	57	55	56	60	63	67	52	45	62	53.1
68	56	41	31	37	47	44	47	33	38	44	38	34	36	38	33	36	
81	81	52	51	56	58	54	52	56	57	56	54	66	68	50	42	58	52.0
65	52	37	33	40	44	48	44	39	38	48	36	39	48	38	33	35	
83	83	58	50	57	59	55	53	57	60	57	60	63	66	57	43	48	50.3
63	58	33	25	34	35	47	45	34	34	38	32	33	45	37	32	41	
85	84	53	57	58	59	54	56	60	60	57	60	65	70	48	47	60	53.2
61	53	38	33	39	43	49	45	38	36	47	40	38	46	40	36	37	
80	79	50	55	64	62	53	56	58	56	53	55	68	69	44	54	64	56.0
72	50	40	35	48	53	50	47	38	42	45	44	50	50	40	37	44	
72	74	49	45	49	51	51	49	51	49	51	50	53	59	48	39	47	53.4
86	81	63	65	61	60	55	59	68	69	61	65	74	73	58	47	58	53.3
58	61	34	30	38	40	46	37	37	37	41	41	37	46	38	31	37	
85	83	70	58	52	59	55	56	60	57	55	58	66	70	58	50	59	54.5
63	69	37	33	42	44	49	47	43	41	44	40	42	52	39	34	33	
88	87	65	59	62	59	55	52	62	59	56	56	69	73	52	45	59	53.6
59	65	37	28	39	45	45	48	42	33	46	42	35	45	39	32	34	
87	84	61	59	59	59	55	53	60	62	57	59	65	70	59	45	58	53.4
44	61	35	32	39	44	48	43	40	38	45	41	38	47	38	32	37	
83	84	58	57	59	57	53	50	59	60	56	55	65	67	56	42	55	52.1
62	58	35	28	39	44	47	46	42	35	44	42	36	49	39	33	37	
88	84	62	59	58	57	55	52	60	60	58	60	69	72	57	44	57	53.3
62	61	34	32	38	41	47	46	36	36	45	39	39	41	38	32	38	
68	69	50	43	48	49	50	48	48	46	50	51	51	53	46	37	41	51.1

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir ; (2a) Intake

DAILY AND MONTHLY PRECIP

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	0.00	0.01	0.00	0.00	0.00	T.	0.20	0.01	T.	0.00	T.	0.25	0.00	0.00
Alfred		T.				T.	.25	.01				.20		
Angelica						T.	.20	T.			.01	.17		
Bolivar .....							.15					.34		
Franklinville.....							.38	T.				.15		
Humphrey.....							.26	T.				.07		
Little Valley.....														
Napoli .....							.16	T.				.12		
Cherry Creek.....							.57				T.	.68		
Jamestown .....							.19					.15		
Elmira .....							.12					.08		
Pine City .....		.06					.14					.19		
Akron						T.	.05	T.			T.	.95		
Avon						T.	.12	T.				.17		
Mt. Morris.....							.20	.10				.20		
Nunda														
Lockport .....							.15	T.				.88		
Victor														
Wedgewood.....							.05					.17		
Addison.....		.04					.10					.07		
Atlanta .....							.20	.03				.30		
Haskinville.....							.20					.10		
South Canisteo....		.01					.10		T.		.05	.27		
Arcade.....							.46	T.				.34		
<i>Eastern Plateau...</i>	0.00	T.	0.00	0.00	0.00	T.	0.11	0.01	0.01	T.	?	0.26	T.	0.00
Binghamton (1) ..							.15					.39		
Binghamton (2) ..		T.					.12	T.				.83		
Chenango Forks....														
Oxford.....						T.	.20	T.				.41	.02	
Cortland .....									.19	T.				
South Kortright....							.25					.73		
Bouckville.....							.09					.32		
Fayetteville.....							.08							
Middletown.....		T.					.03					.62		
Port Jervis.....								.13				.76		
Warwick .....							.11					1.00		
Cooperstown .....							.14	.03				.32		
Garrattsville.....												.53		
New Lisbon.....							.12	.02				.44		
Oneonta .....							.14	.03				.29		
Schenenys						T.	.17	.01	T.			.49	.02	
Perry City .....							.18					.04		
Newark Valley		T.					.05	T.				.12		
Straits Corners.....		T.					.13					.12		
Waverly .....		.01					.12					.12		
Dryden						T.	.15	T.	.02			.18		
Mohonk Lake.....											*	†1.06		
<i>Northern Plateau...</i>	0.00	0.00	0.00	0.00	T.	0.06	0.07	0.01	T.	0.00	T.	0.79	0.00	0.00
Elizabethtown.....							.44					.10		
Lake Placid .....												.41		
Saranac Lake.....					.02	T.		.08			T.			
Gloversville						T.	.30	T.				1.10		
Little Falls (2a) ..					T.		.09	.03	T.			.61		
North Lake												1.62		
Lowville .....						.03			.03			.49		
Number Four .....							.03		.01			.68		
Kings Station.....							.15					1.30		
<i>Atlantic Coast....</i>	0.00	0.05	0.00	0.00	0.00	T.	0.02	0.01	0.00	0.00	T.	0.52	0.01	0.00
Brooklyn .....		.11				T.	T.					1.01		
Manhattan Beach ..														
New York City .....		.04					T.					.24	.05	
Willels Point .....							.08					.17		

TATION FOR OCTOBER, 1897 — (INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.00	T. .01	T.	0.00	0.01	0.03 .02	0.13 .13	0.14 .05	T.	T.	0.00	0.00	T.	0.10 .35	0.01 .06	*T. T.	T.	0.89 1.02
.....	.....	.....	.....	.....	T. .02	T. .06	T. .07	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.65
.....	.....	.....	.....	.....	T. .06	T. .09	T. .03	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.70
.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.75
.....	.02	.....	.....	.....	.14	.05	.....	.....	.....	.....	.....	.....	.06	T.	T.	.....	0.60
.....	T.	.....	.....	.....	.01	.10	.11	.....	.....	.....	.....	.....	.02	.....	T.	.....	0.52
.....	.....	.....	.....	.....	T.	.13	1.00	.....	.....	.....	.....	.....	.....	T.	T.	.....	2.28
.....	.....	.....	.....	.....	.....	.16	.19	.....	.....	.....	.....	.....	T.	T.	T.	.....	0.69
.....	.....	.....	.....	.....	.....	.40	.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	0.65
.....	.....	.....	.....	.....	T.	.08	.31	.....	.....	.....	.....	.....	.....	.13	.....	.....	0.91
.....	.....	.....	.....	.13	T.	.21	.....	T.	T.	.....	.....	.....	T.	T.	.....	.....	1.34
.....	.....	.....	.....	.....	T.	.38	.05	.....	.....	.....	.....	.....	T.	.....	.....	.....	0.72
.....	.....	.....	.....	.....	T.	.10	T.	.....	.....	.....	.....	T.	.....	.....	.....	T.	0.60
.....	.....	.....	.....	.....	.....	.....	.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.81
.....	.....	.....	.....	.....	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.83
.....	.....	T.	.....	.....	.07	.08	.12	.....	.....	.....	.....	.....	.25	.....	T.	.....	0.74
.....	.....	.....	.....	.....	.05	.14	.48	.....	.....	.....	.....	.....	.06	.....	T.	.....	0.94
.....	.....	.....	.....	.....	.08	.09	.....	.....	.....	.....	.....	.....	.44	.04	.....	.....	1.18
.....	.....	.....	.....	.....	.05	.20	.....	.....	.....	.....	.....	.....	.10	.....	T.	.....	0.68
.....	T.	.....	.....	.....	.25	T.	.08	.....	.....	.....	.....	.....	.28	T.	T.	.....	1.04
.....	T.	.....	.....	.....	T.	.09	.08	.....	.....	.....	.....	.....	T.	.....	.....	.....	0.97
0.00	T.	T.	0.00	T.	T.	0.04	0.05	T.	T.	0.03	T.	0.00	0.08	0.06	T.	T.	0.79
.....	T.	T.	.....	.....	T.	T.	.06	.04	.....	.....	.....	.....	.....	.18	.....	.....	0.82
.....	.....	.....	.....	.....	T.	.05	.02	.01	.....	.....	.....	.....	.09	.04	T.	.....	0.66
.....	.....	.....	.....	.....	.....	T.	.05	.....	.....	.....	.....	.....	T.	.12	.....	.....	1.00
.....	.....	.....	.....	.....	.....	.....	.13	.04	.....	.....	.....	.....	.13	.22	T.	T.	0.71
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.24	.....	.....	0.98
.....	.....	.03	.....	.....	.....	.05	.12	.....	.....	.....	.....	.....	.13	.04	.....	.....	0.68
.....	.....	.....	.....	.03	.....	.....	.....	.....	.05	.....	.....	.....	T.	.....	.....	.....	0.42
.....	.....	.....	.....	.....	.....	.....	.12	.....	.....	.12	.....	.....	.....	.05	.....	.....	0.73
.....	.....	.....	.....	.....	T.	.....	.....	T.	.....	.12	.....	.....	.....	.10	.....	.....	1.18
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	.....	.....	.....	.....	.....	1.63
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	.....	0.64
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.06	.....	.....	0.59
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.13	.02	.....	0.73
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.46
.....	.....	.....	.....	.....	T.	.27	.08	.....	.....	.....	.02	.....	.15	.12	.....	.....	0.73
.....	.....	.....	.....	.....	.....	.02	.04	.....	.....	.....	.....	.....	.06	.05	.02	.....	0.86
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.36
.....	.....	.....	.....	.....	T.	.10	.01	.....	.....	.....	.....	.....	.05	.05	T.	.....	0.52
.....	.....	.....	.....	.....	.02	.06	.30	.03	.....	.....	.01	.....	.05	T.	.....	.....	0.79
.....	.....	.....	.....	.....	.....	.09	.03	.....	.....	.....	.....	.....	.38	.15	T.	.....	1.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.06
0.02	0.40	0.03	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.15	0.07	0.04	0.00	1.70
.....	1.10	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.24	.....	1.88
.....	.15	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.....	1.41
.....	T.	.....	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.18	.....	.....	.....	1.59
.....	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.46	.22	.....	.....	1.45
.....	.26	.26	.....	.....	.....	.....	.10	.....	.....	.....	.....	.....	.16	.08	.....	.....	2.08
.....	1.02	.....	.....	.....	.....	.....	.30	.....	.....	.....	.....	.....	.05	.12	.....	.....	1.34
.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.34	.....	.....	.....	2.38
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	1.45
0.00	0.00	0.00	0.00	0.00	0.02	T.	0.04	0.01	0.21	0.55	T.	0.60	T.	0.03	0.00	0.00	1.48
.....	.....	.....	.....	.....	.04	.....	.03	.....	.08	.40	.....	.....	.....	.02	.....	.....	1.69
.....	.....	.....	.....	.....	.02	T.	.05	.01	.06	.23	.01	.....	.....	.01	.....	.....	0.72
.....	.....	.....	.....	.....	T.	T.	T.	.....	.35	.10	.....	.....	.....	T.	.....	.....	0.70

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Albany Coast (Con)</i>														
Brentwood.....		.10										.60		
Setauket.....		.03				T.	T.				T.	.30		
Bedford.....		.01					.02	.09			T.	.86		
Primrose.....		.04				T.	.04	T.				.41		
<i>Hudson Valley</i>	T.	T.	0.00	0.00	T.	T.	0.02	T.	T.	0.00	T.	0.85	0.08	0.00
Albany.....						.01	.01		T.		T.	.70	.11	
Cedar Hill.....					T.	T.	.01					.85	.06	
Hu-y-mead Brook.....		T.					T.					.88		
Poughkeepsie.....							.03					.10		
Wappingers Falls.....							.05				T.	1.12		
Catskill.....						T.	T.					.81		
West Point.....		T.					.08					1.05		
Boyd's Corners.....														
Cornel.....	T.											.54		
<i>Southeast Reservoir</i>														
Eagle Mills.....							.02					1.00		
Easton.....												1.02	.32	
Greenwich.....						T.	.08	T.				1.28	.34	
<i>Mohawk Valley</i>	0.00	0.00	0.00	0.00	0.08	0.01	0.04	0.01	0.00	0.00	0.00	0.43	0.00	0.00
Little Falls (1a).....					.30							.47		
Canajoharie.....						T.	.09					.48		
St. Johnsville.....						.03	.06					.56		
Rome.....								.03				.22		
<i>Champlain Valley</i>	0.00	0.00	0.00	0.00	0.00	0.02	0.04	T.	0.02	0.00	T.	1.16	0.05	0.00
Plattsburgh Barrks.....									.05				.20	
Ticonderoga.....						.05			.02			1.92		
Glens Falls.....						T.	.11					1.41		
Lake George.....						.03	.06	.02			.02	1.31		
<i>St. Lawrence Valley</i>	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.03	T.	0.00	T.	0.23	0.00	0.00
Harris Barracks.....									T.			.39		
Watertown.....														
Canton.....												.23		
DeKalb Junction.....												.28		
North Hammond.....								.12			.01	.08		
Ogdenburg.....						.80						.13		
Potsdam.....						.05		.07				.25		
<i>Great Lakes</i>	0.00	0.00	0.00	0.00	T.	0.02	0.14	0.02	T.	0.00	T.	0.25	0.03	
Westfield.....						.74								
Buffalo.....						T.	.16	.04	T.		.01	.37		
Adams Centre.....												.18		
Pittsford.....						T.	.29	.05				.08		
Rochester.....						T.	.16	.03	T.		.02	.07		
Scottsville.....							.18							
Appleton.....						T.	.18	.03				.33		
Fort Niagara.....						.30						.40		
Niagara Falls.....					T.		.14	.04				.61		
Baldwinsville.....							.12					.38		
Lyncoville.....							.22	.02				.22		
Ridgeway.....						.02	.21	.02				.27		
Fulton.....							.01	.05				.20		
Oswego.....						T.	.11	T.			T.	.19		
Palermo.....						T.	.02					.18		
Phoenix.....						T.	.02	.07	.02			.01	.52	
Lyons.....						T.	.01	T.			T.	.18		
Rose.....						T.	.05	T.				.32		
Erie, Pa.....					T.		.07					.80		

TATION FOR OCTOBER — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.....	.....	.....	.....	.....	.10	.....	.20	.....	.30	.20	.....	.....	.....	.....	.....	.....	1.50
.....	.....	.....	.....	.....	T.	.....	.....	.06	.33	1.00	T.	.....	T.	.11	.....	.....	1.79
.....	.....	.....	.....	.....	.....	.....	.....	.02	.01	.28	.....	.....	.....	.01	.....	.....	2.03
.....	.....	.....	.....	.....	T.	.....	.03	.....	.38	.97	.....	.....	.....	.07	.....	.....	1.94
0.00	0.00	0.00	0.00	0.00	0.00	T.	T.	T.	0.00	0.03	0.00	0.00	0.04	0.02	0.00	0.00	1.11
.....	.....	.....	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.09	.08	.....	.....	1.01
.....	.....	.....	.....	.....	.....	.....	T.	T.	.....	.....	.....	.....	.....	T.	.....	.....	0.95
.....	.....	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.....	.....	.04	.....	.....	0.93
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.13
.....	.....	.....	.....	.....	.....	T.	.02	.....	.....	.03	.....	.....	.....	.02	.....	.....	1.24
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	0.81
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	.30	.....	.....	1.43
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.01
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.35	.....	.....	.....	.....	.....	.....	0.89
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.13
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.02
.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.34
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.03	.....	.....	1.73
0.00	0.01	0.00	0.00	0.00	0.00	T.	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.07	0.00	0.04	0.84
.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.46	.....	.....	.08	1.31
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.17	.....	.....	.....	0.74
.....	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.28	.....	.....	0.93
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.09	0.28
T.	0.05	0.02	0.00	0.00	0.00	0.00	T.	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.00	0.00	1.46
.....	.....	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.22	.....	.....	0.52
.....	.12	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	.....	2.19
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	.....	.....	.....	1.52
.02	.07	T.	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.06	T.	.....	.....	1.59
0.30	0.16	0.00	0.00	0.00	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.01	0.80
.....	.22	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	.....	.06	.....	.....	.08	0.80
.....
.....	.10	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.31	.....	.....	0.64
.....	.31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.07	.....	.....	0.86
.....	.20	.....	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	.....	.11	.....	.....	0.78
.....	.02	.....	.....	.....	.....	.....	.15	.....	.....	.....	.....	.....	.....	.08	.....	.....	1.19
.....	.07	.....	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	.....	.06	.....	.....	0.55
0.00	0.02	T.	0.00	T.	0.15	0.12	0.05	T.	T.	0.00	T.	T.	0.01	0.05	T.	T.	0.87
.....	.....	.....	.....	.....	.93	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.72
.....	T.	T.	.....	.....	.10	.10	T.	.....	.....	.....	.....	.....	.....	.01	.01	.....	0.80
.....	.18	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.42
.....	T.	.....	.....	.....	.34	.11	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	0.97
.....	T.	T.	.....	.....	.34	.11	.01	.....	.....	.....	.....	.....	.....	T.	.23	T.	0.97
.....	.....	.....	.....	.....	.....	.43	.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.68
.....	T.	.....	.....	.....	.24	.15	.06	.....	.01	.....	.....	.01	.04	T.	.....	.....	1.05
.....	.....	.....	.....	.....	.35	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05
.....	.....	.....	.....	.....	.23	.06	.17	.....	.....	.....	.....	.....	T.	.06	.....	.....	1.31
.....	T.	.....	.....	.....	.....	.15	.....	.....	.....	.....	.....	.....	.....	T.	T.	.....	0.65
.....	T.	.....	.....	.....	.08	.34	.07	.....	.....	.....	.....	.....	.....	T.	T.	.....	0.95
.....	T.	.....	.....	.....	.14	.28	.06	.....	.....	.....	.....	.....	.....	.02	.05	.....	1.07
.....	.....	.....	.....	.....	.10	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.46
.....	.01	.02	.....	.....	T.	.06	.01	.....	.....	.....	.....	.....	.....	.06	.05	.....	0.51
.....	.10	.....	.....	.....	.....	.01	.01	.....	.....	.....	.....	.....	.....	.05	.....	.....	0.40
.....	.....	.03	.....	.....	.....	T.	.12	.01	.....	.....	.....	.....	.....	.....	.04	.06	0.90
.....	.....	.....	.....	.....	.05	.11	.....	.....	T.	.....	.01	.....	.....	.03	.....	.....	0.48
.....	.....	.01	.....	.....	.03	.13	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.86
.....	T.	T.	.....	.....	.04	.0	.29	.....	.....	.....	.....	.....	T.	T.	T.	.....	1.24

DAILY AND MONTHLY PRECIPITATION

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.00	0.00	0.00	0.00	0.00	0.01	0.09	0.16	0.00	0.00	0.00	0.15	0.00	0.03
Auburn .....							.16	.05				.26		
Fleming .....												.39		
Sherwood .....						.09		1.06						.27
Skaneateles .....						.01	.09	.03				.24		
Watkins .....							.05	T.				.05		
Romulus .....							.31	.09				.08		
Ithaca .....							.06	T.				.19		
Penn Yan .....							.07	.05				.08		
Average	T.	0.01	0.00	0.00	0.01	0.03	0.07	0.03	T.	T.	T.	0.50	0.02	T.

†Record for the month incomplete.
 polated from values at other stations.

|| Received too late to be included in the averages.

TATION FOR OCTOBER — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.00	0.00	0.01	0.00	0.00	0.01	0.13	.04	0.00	0.00	0.00	0.00	0.00	0.26	0.08	T.	0.05	1.01
.....11	.....	.....	.....	.....	.....	.....	.10	.07	.....	.....	0.75
.....19	.....	.....	.....	.....	.....	.....	.23	.....	T.	.27	0.80
.....11	.05	.....	.....	.....	.....	.....	.56	.06	.....	.15	2.38
.....05	.....	.....	.01	.11	.....	.....	.....	.....	.....	.....	.20	.15	.01	.....	0.95
.....04	.08	.05	.....	.....	.....	.....	.....	.22	.03	T.	.....	0.52
.....31	.....	.....	.....	.....	.....	.....	.28	.14	.....	.....	1.21
.....	T.	.....	.....	.01	.10	.09	.....	.....	.....	.....	.....	.27	.16	T.	.....	0.88
.....01	.14	.....	.....	.....	.....	.....	.....	.24	.03	T.	.....	0.62
T.	0.06	0.01	0.00	T.	0.02	0.04	0.05	T.	0.02	0.06	T.	T.	0.09	0.05	T.	0.01	1.10

* Amount included in next measurement.

† Not included in computing averages.

§ Inter-

STATISTICS OF TEMPERATURE

STATION	COUNTY.	TEMPERATURE DEGREES (FAHR.).									
		Normal for the month of October	Length of record, years.	Record begins.	Record ends.	Mean for October, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR OCTOBER.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau</i>		47.6	..	..	..	52.3	+4.7	..	..	..	..
Angelica.....	Allegany.....	45.8	15	1854	1897	51.0	+5.2	51.0	1897	39.6	1889
Humphrey.....	Cattaraugus.....	47.1	15	1883	1897	52.4	+5.3	52.4	1897	42.4	1895
Elmira.....	Cheung.....	49.9	19	1750	1897	53.6	+3.7	53.7	1894	45.0	1859
<i>Eastern Plateau</i>		45.9	..	..	..	50.1	+3.5	..	..	..	..
Oxford.....	Chenango.....	46.3	29	1825	1897	48.8	+2.5	51.1	1846	39.8	1836
Cortland.....	Cortland.....	45.9	35	1829	1897	52.4	+6.5	52.4	1897	38.4	1836
Cooperstown.....	Otsego.....	46.5	44	1854	1897	48.5	+2.0	53.3	1879	40.7	1865
Waverly.....	Tioga.....	48.9	46	1882	1897	51.7	+2.9	57.6	1888	42.9	1889
<i>Northern Plateau</i>		45.8	..	..	..	49.4	+3.6	..	..	..	..
Lowville.....	Lewis.....	45.8	31	1827	1897	49.4	+3.6	51.4	1835	40.6	1841
<i>Atlantic Coast</i>		54.2	..	..	..	56.0	+1.8	..	..	..	..
New York City.....	New York.....	53.1	27	1871	1897	56.0	+0.9	60.1	1879	50.0	1876
Setauket.....	Suffolk.....	53.4	13	1885	1897	56.0	+2.6	56.0	1897	50.0	1888
<i>Hudson Valley</i>		49.8	..	..	..	51.6	+1.8	..	..	..	..
Albany.....	Albany.....	50.8	24	1874	1897	53.0	+2.2	55.8	1879	45.0	1889
Honeynead Brook...	Dutchess.....	48.8	17	1881	1897	50.3	+1.5	53.1	1882	44.6	1895
<i>Champlain Valley</i> ...		46.9	..	..	..	47.9	+1.0	..	..	..	..
Plattsburgh Barracks	Clinton.....	46.9	43	1829	1897	47.9	+1.0	53.6	1879	42.0	1888
<i>St. Lawrence Valley</i>		47.6	..	..	..	49.0	+1.4	..	..	..	..
Madison Barracks...	Jefferson.....	49.1	38	1839	1897	50.5	+1.4	51.6	1879	41.4	1889
Canton.....	St. Lawrence	47.2	35	1862	1897	47.6	+0.4	50.2	1879	38.8	1889
North Hammond.....	"	47.7	15	1866	1897	49.6	+1.9	54.3	1870	41.5	1889
Potsdam.....	"	46.6	30	1828	1897	48.4	+1.8	52.0	1835	36.9	1836
<i>Great Lakes</i>		49.9	..	..	..	53.2	+3.3	..	..	..	..
Buffalo.....	Erie.....	50.4	27	1871	1897	51.0	+3.6	58.3	1879	45.0	1888
Rochester.....	Monroe.....	49.9	27	1871	1897	51.0	+4.1	57.6	1879	43.9	1889
Fort Niagara.....	Niagara.....	50.5	42	1842	1897	54.2	+3.7	59.1	1879	43.4	1856
Baldwinsville.....	Onondaga.....	48.5	19	1854	1897	52.2	+3.7	52.4	1894	43.5	1875
Oswego.....	Oswego.....	50.5	27	1871	1897	52.0	+1.5	59.8	1872	43.9	1883
Palermo.....	"	47.3	44	1851	1897	50.3	+3.0	53.9	1879	41.8	1889
Erie, Pennsylvania..	Erie.....	52.2	24	1874	1897	56.0	+3.8	60.0	1879	46.0	1897-95
<i>Central Lakes</i>		49.3	..	..	..	52.1	+2.8	..	..	..	..
Ithaca.....	Tompkins.....	49.3	19	1879	1897	52.1	+2.8	56.0	1879	42.9	1889
Average departure.....							+2.8				

AND PRECIPITATION — OCTOBER.

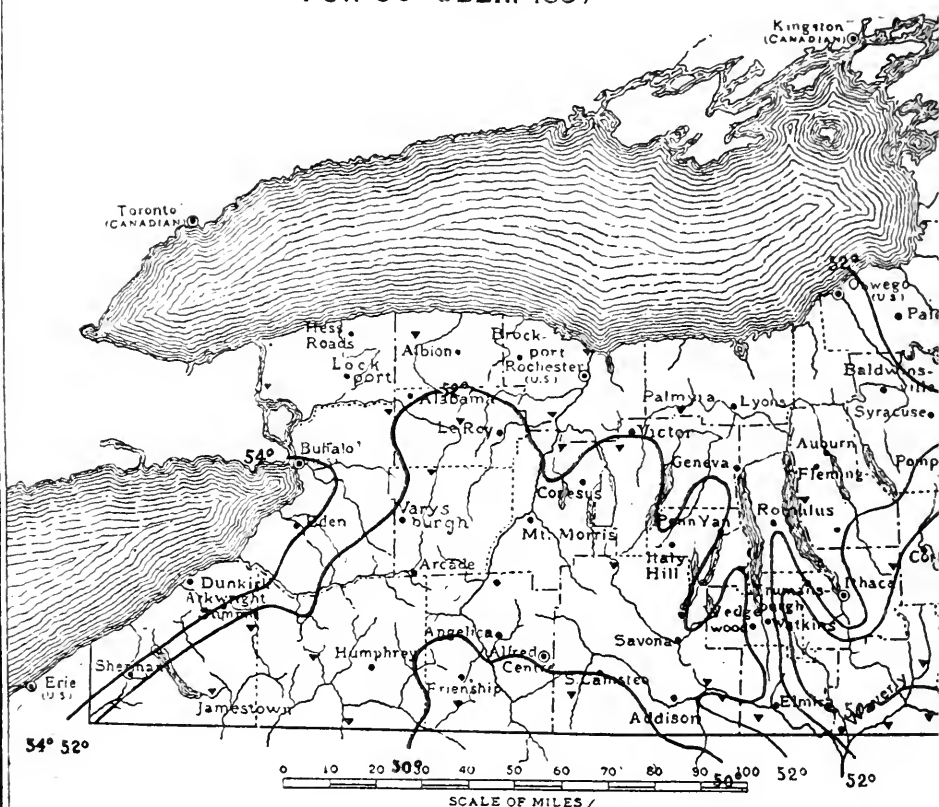
STATION.	COUNTY.	PRECIPITATION — (INCHES.)									
		Average for the month of October.	Length of record, years.	Record begins.	Record ends.	Total for October, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR OCTOBER.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau</i>		3.09	..	.....	.....	0.63	-2.46	.....	.....	.....	.....
Anchela.	Allegany	2.92	14	1856	1897	0.65	-2.33	6.44	1853	0.65	1897
Humphrey.	Cattaraugus..	3.27	15	1883	1897	0.60	-2.67	5.94	1890	0.60	1897
Elmira.	Chemung	3.02	20	1850	1897	0.65	-2.37	7.00	1861	0.65	1897
<i>Eastern Plateau</i>		3.19	..	.....	.....	0.82	-2.37	.....	.....	.....	.....
Oxford.	Chenango	3.15	26	1829	1897	0.80	-2.35	5.97	1894	0.67	1839
Cortland	Cortland	3.61	20	1850	1897	0.71	-2.90	6.73	1862	0.71	1897
Cooperstown	Otsego	3.19	44	1854	1897	0.64	-2.55	6.65	1857	0.64	1897
Port Jervis	Orange	3.04	13	1889	1897	1.18	-1.86	7.25	1890	0.61	1892
Waverly	Tioga	2.95	16	1882	1897	0.79	-2.16	5.60	1885	0.70	1882
<i>Northern Plateau</i>		3.17	..	.....	.....	1.34	-1.83	.....	.....	.....	.....
Lowville	Lewis	3.17	34	1827	1897	1.34	-1.83	5.80	1850	0.46	1839
<i>Atlantic Coast</i>		4.06	..	.....	.....	1.25	-2.81	.....	.....	.....	.....
New York City	New York	3.34	27	1871	1897	0.72	-2.62	7.69	1877	0.58	1879
Setauket.	Suffolk	4.79	13	1885	1897	1.79	-3.00	10.20	1830	0.90	1892
<i>Hudson Valley</i>		3.45	..	.....	.....	1.10	-2.35	.....	.....	.....	.....
Albany.	Albany.	2.77	21	1874	1897	1.01	-1.76	7.86	1877	0.27	1882
Honeymead Brook	Dutchess.	3.16	17	1881	1897	0.93	-2.23	6.43	1891	0.92	1892
Poughkeepsie.	"	3.52	22	1830	1897	0.13	-3.39	8.64	1833	0.13	1897
West Point	Orange	3.82	50	1840	1897	1.43	-2.39	10.25	1855	T.	1892
Boyd's Corners	Putnam	3.98	27	1870	1897	2.01	-1.97	8.38	1877	0.92	1892
<i>Champlain Valley</i>		2.77	..	.....	.....	0.52	-2.25	.....	.....	.....	.....
Plattsburgh Barracks..	Clinton	2.77	38	1840	1897	0.52	-2.25	7.64	1850	0.46	1879
<i>St. Lawrence Valley</i>		3.96	..	.....	.....	0.71	-3.25	.....	.....	0.80	.....
Madison Barracks.	Jefferson.	4.97	37	1840	1897	0.80	-4.17	12.39	1850	0.76	1897
North Hammond	St. Lawrence.	3.98	15	1866	1897	0.78	-3.20	9.21	1872	0.55	1895
Potsdam	"	2.94	29	1828	1897	0.55	-2.39	6.11	1843	.....	1897
<i>Great Lakes</i>		3.13	..	.....	.....	0.83	-2.30	.....	.....	0.74	.....
Buffalo	Erie	3.51	27	1871	1897	0.80	-2.71	7.32	1881	0.58	1879
Rochester	Monroe.	2.76	27	1871	1897	0.97	-1.79	8.67	1873	0.69	1896
Fort Niagara	Niagara	2.21	42	1841	1897	1.05	-1.16	5.25	1864	0.50	1892
Oswego	Oswego	3.10	27	1871	1897	0.51	-2.59	7.55	1878	0.30	1882
Palermo	"	3.30	38	1860	1887	0.40	-2.90	7.90	1862	.....	1882
Erie, Pennsylvania	Erie	3.90	25	1873	1897	1.24	-2.66	8.17	1885	1.18	1879
<i>Central Lakes</i>		2.94	..	.....	.....	0.88	-2.06	.....	.....	.....	.....
Ithaca	Tompkins	2.94	19	1879	1897	0.88	-2.06	5.26	1885	0.31	1879
Average departure ..	.....	.....	.....	.....	.....	.....	-2.45	.....	.....	.....	.....

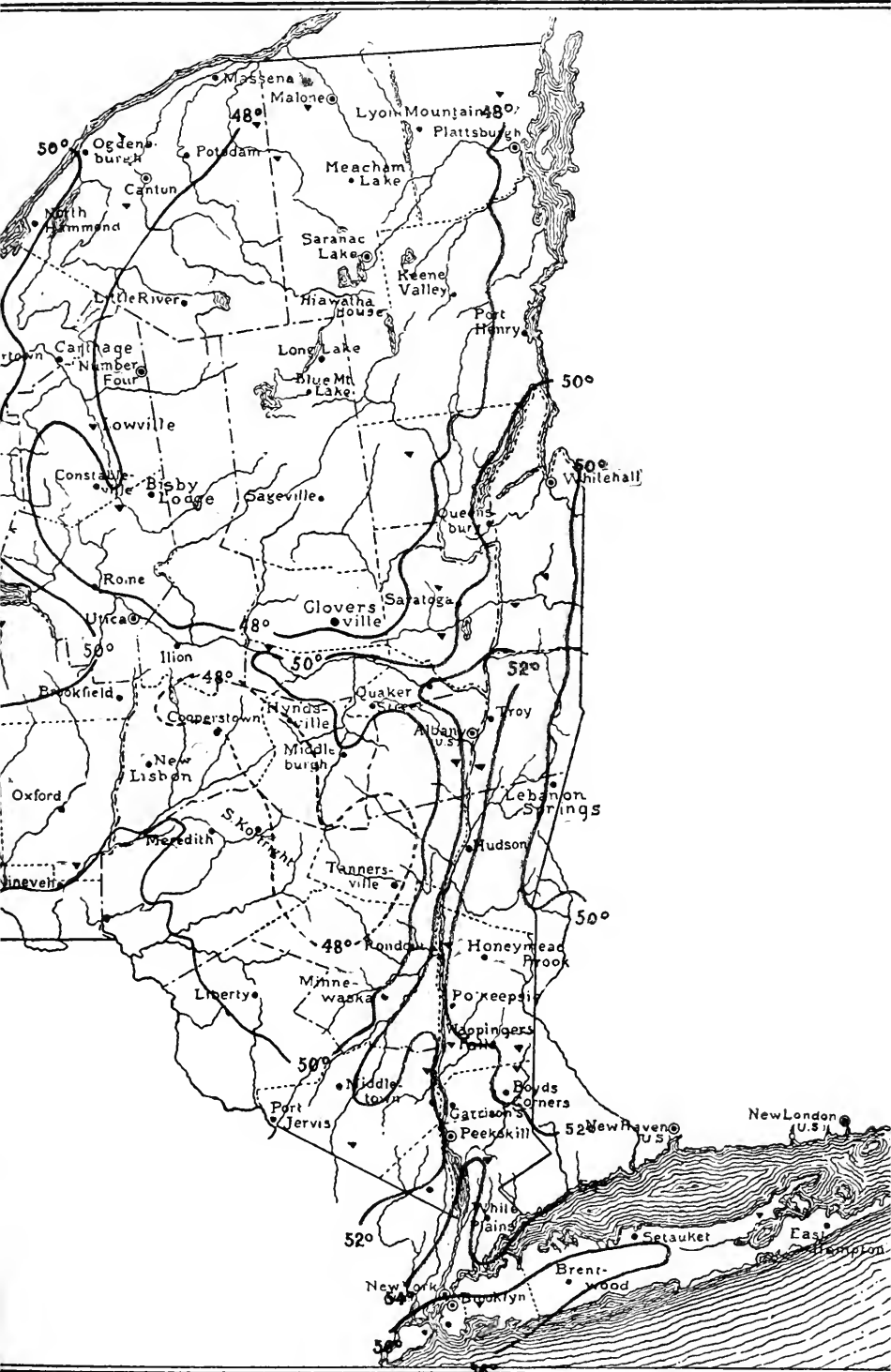
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR OCTOBER, 1897





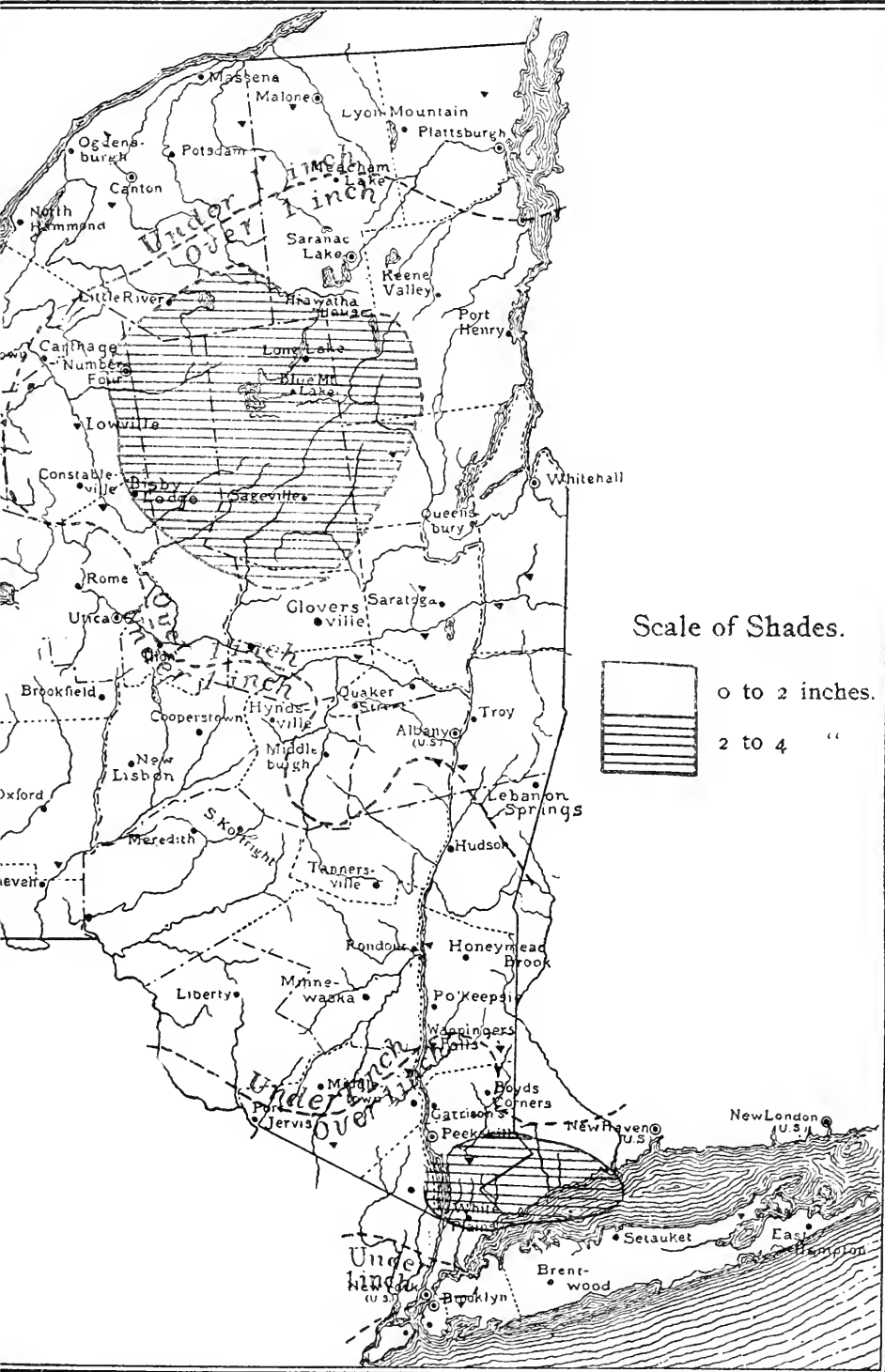
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR OCTOBER, 1897





Meteorological Summary for November, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State was 30.06 inches. The highest barometer was 30.64 inches at Albany on the 28th, and the lowest, 29.06 inches at Oswego on the 9th. The mean pressure was considerably higher in the eastern section than along the Lakes. The average pressure for the month was very nearly normal, lake stations only reporting slight deficiencies.

The mean temperature of the State was 37.6 degrees, as derived from observations of maxima and minima at 81 stations. The highest local mean was 45.3 degrees at Setauket, the lowest being 30.1 degrees at Saranac Lake. The highest general daily mean was 50 degrees on the 5th, and the lowest 22 degrees on the 24th. The maximum temperature reported was 70 degrees at Bedford on the 4th, and the minimum, 3 degrees below zero at Number Four on the 24th. The mean monthly range of temperature for the State was 52 degrees, the greatest local value being 65 degrees at Lowville, and the least, 42 degrees at Palermo and Arkwright. The mean daily range was 15 degrees. The greatest local daily range was 53 degrees at Little Falls (2a) on the 28th, the least being 1 degree at Lockport on the 1st and at Canajoharie on the 2d. The mean temperature of the various regions of the State were as follows: The Western Plateau, 38.5 degrees; the Eastern Plateau, 37.4 degrees; the Northern Plateau, 33.0 degrees; the Atlantic Coast, 43.5 degrees; the Hudson Valley, 38.9 degrees; the Mohawk Valley, 35.2 degrees; the Champlain Valley, 35.1 degrees; the St. Lawrence Valley, 34.8 degrees; the Great Lake Region, 39.9 degrees; the Central Lake Region, 39.6 degrees. The mean temperature of the State, as derived from observations at 26 stations having records for previous years, was 0.6 degrees above the normal, excesses being reported from 17 stations, located mainly in the central and southern sections.

The mean relative humidity was 78 per cent. The mean dew-point was 33 degrees.

The average precipitation for the State was 4.96 inches of rain and melted snow, as derived from the records of 109 stations. In the southern Adirondacks and vicinity the precipitation ranged from 8 to 10 inches or more, while in much of the western-central section the amount was under 4 inches. The maximum local precipitation was 10.24 inches at North Lake, the minimum being 2.19 inches at Avon. A list of the largest rates of rainfall will be found in the table of meteorological data. The average total snowfall at 68 well distributed stations was 5.9 inches. The average amount in the central interior was about 5 inches, and on the northern highlands, about 10 inches. The least general snowfall occurred on the Atlantic Coast. The distribution of snow near the Lakes was very uneven, the amounts ranging from 1 inch at Fort Niagara to 43 inches at Palermo (the latter being the maximum for the State). The average precipitation for the State was 1.51 inches above normal, as derived from measurements at 26 stations having records covering 10 years or more. Excesses occurred at all stations excepting Madison Barracks. The amounts were the largest on record for November at Port Jervis, Lowville, Honeymead Brook, Oswego and Palermo.

The average number of days on which the precipitation amounted to 0.01 inches or more was 14.7; the number being greatest over the Great Lake Region, the Northern Plateau and the Mohawk Valley, and least in western-central New York, the Coast Region and the St. Lawrence Valley. The average number of clear days was 4.4; of partly cloudy days, 7.5; and of cloudy days, 18.1; giving an average cloddiness of 69 per cent. In general the cloddiness was considerably greater in western and northern New York than in the eastern section.

The prevailing winds were from the west. The average total wind travel at 6 stations of the National Bureau was 9,962 miles. The travel was greater than usual at both eastern and Lake stations. The highest velocity recorded was 56 miles at Buffalo on the 6th.

Thunderstorms (including distant thunder or lightning) were reported from Wedgewood, South Canisteo, Ithaca and Waverly on the 2d; from Addison and Waverly on the 8th; from 9 western, northern and eastern stations on the 9th; from 4 southwestern and 1 eastern station on the 11th; from South Canisteo and Waverly on the 25th.

Auroras were observed at St. Johnsville on the 2d and 17th and at Bedford on the 2d.

Hail fell on the 6th, 8th, 9th, 16th, 25th, 27th, 29th, 30th; and sleet on the 6th, 9th, 11th, 12th, 14th and 25th.

Solar halos were observed on the 7th, 10th, 14th, 16th; and Lunar halos on the 4th, 11th and 30th.

GENERAL FEATURES OF THE WEATHER.

This month was somewhat warmer than usual, the excess of temperature occurring mainly during the first week, and near the close of the month, with generally seasonable weather in the interval.

More than the usual rain and snowfall occurred over the State at large, the greatest excesses occurring in the region of the southern Adirondacks. As usual, in November, the storm frequency was decidedly greater than for the preceding autumn months, while the percentage of cloudy weather was very large, especially in the west and north. A heavy snowfall occurred in restricted northern and highland sections, and eastward of Lake Ontario, but generally the fall was slight and quickly disappeared.

Six areas of high and nine areas of low pressure influenced the weather in this vicinity during the month, with the exception of the storms of the 9th and 11th, the depressions were of moderate energy. About half of their number approached this State from the southwest, following, nearly, the winter course, while of the remainder, three passed eastward along the Canadian border, and one was central over the Atlantic. The anti-cyclones, as a rule, moved south-eastward from their place of appearance on the Pacific Coast, but with a tendency to spread northward when near the Atlantic States. The absence of the severe winter weather which was reported in the West was probably due, in part, to the southerly trend of the highs.

The following is a brief account of the atmospheric movements of the month:

Low I, 29.6 inches, originating over the Mexican Gulf, moved northeastward, and was central over New York on the 2d to 3d, bringing the heaviest general rains of the month, with mild weather.

High I followed a southerly course to the Atlantic States, spreading along the coast on the 3d to 5th and maintaining the moderate temperatures.

Low II, 29.6 inches, passed from the Missouri Valley section over the Upper Lakes and northeastward. This area caused gales on the Lakes, with light showers on the 6th, and the highest temperature of the month. A steadily falling temperature occurred in its rear, with the approach of

High II, 30.3 inches, a larger area covering the eastern part of the continent on the 7th.

Low III, 29.2 inches, developed in the Southwest, crossing the Lower Lakes and the St. Lawrence Valley on the 9th, with general rains, which were heavy at some Northern stations. The maximum wind velocity for the month occurred at coast stations on the 9th. Partly cloudy weather on the 10th was followed by two days of moderate rain, due to

Low IV, 29.2 inches, passing along the Canadian border and northern New York on the 11th and 12th, with high winds on the Lakes.

High III, 30.4 inches, comprised two sections which passed over the Northern and Southern States respectively, covering the Atlantic States on the 14th and 15th, bringing a slight fall of temperature.

Low V, 29.8 inches, extended from Texas to the Lakes on the 15th, bringing moderate rains which continued during the 16th as the area moved northward; the temperature meanwhile rising 10 degrees above the normal.

High IV, 30.4 inches, united a northern and southern center. The system covered the Atlantic States from the 18th to 21st; the weather being decidedly colder on the 18th and 19th, while showers and snow flurries occurred on the Lakes and highlands.

Low VI, 29.7 inches, passing north of New York on the 21st, brought a warm wave, but little rain.

High V, 30.5 inches, reaching the Central States on the 23d, and thence passing to the coast gave the lowest temperature of the month on the 23d and 24th, causing a condensation of rain or snow in central or southern New York.

Low VII was central off the New England Coast on the 23d.

Low VIII, 29.7 inches, passed from the Central States to the Lakes and northeastward on the 26th to 27th, bringing moderate rains and snow, the temperature meantime rising more than 30 degrees.

High VI, 30.6 inches, like two preceding areas, embraced a northern and a southern center. The system was felt in New York from the 27th to 30th bringing cold clearing weather.

Low IX, 29.8 inches, passed north of New York on the 29th, and gave a heavy snowfall in Oswego county but moderate or light showers in other sections.

NOTES OF OBSERVERS AT THE FOLLOWING STATIONS: Humphrey, thunderstorm with snow on the 11th. South Canisteo, the month ends wintry. A fair supply of water in springs and streams. Wheat seeding in progress on the 4th, and plowing on the 20th. Stock in pasture and grass growing all the month. Arcade, month very favorable for wheat and grass seeding, and these crops much improved. Number Four, lake frozen on the 17th and so remains. Setanket, first killing frost on the 18th. St. Johnsville, first snowflakes on the 10th. Caldwell, Lake George open throughout the month. North Hammond, ground white with snow, but barely frozen at close of the month. Some plowing in progress. Pittsford, light snow on the 9th, the first of the season.

METEOROLOGICAL DATA

LOCATION OF STATIONS			BAROMETER.					HUMIDITY.		TEMPERA				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	dew point (degrees).	Mean of tri daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau.....												38.5	67	a
Alfred.....	Allegany.....	795										38.7	63	5
Angelica.....	".....	340									38.0	38.7	63	5
Bolivar.....	".....	800										38.0	64	5
Franklinville.....	Cattaraugus.....	558										37.6	65	b
Humphrey.....	".....	950									37.2	37.1	65	4
Arkwright.....	Chautauqua.....	1260										38.2	59	b
James town.....	".....	324										39.2	63	b
Elmira.....	Chemung.....	863										40.6	67	6
Avon.....	Livingston.....	585										49.4	67	5
Mt Morris.....	".....	525												..
Nunda.....	".....													..
Lockport.....	Niagara.....	650									39.0	39.0	65	5
Victor.....	Ontario.....											38.6	66	5
Wedgewood.....	Schuyler.....	1350									35.8	36.9	64	4
Addison.....	Steuben.....	1000							73	32	39.8	40.3	64	b
South Canisteo.....	".....	1480							79	31	37.1	37.9	65	b
Arcade.....	Wyoming.....	1797										36.9	63	5
Eastern Plateau.....												37.4	68	4
Binghamton (1).....	Broome.....	870									37.6	38.1	64	4
Binghamton (2).....	".....	875										39.0	66	4
Oxford.....	Chenango.....											36.0	62	5
Cortland.....	Cortland.....	1120										38.2	64	b
South Kortright.....	Delaware.....	1700										35.4	61	c
Bouckville.....	Madison.....	1350										35.4	62	c
Middletown.....	Orange.....	700									38.5	40.0	62	4
Port Jervis.....	Orange.....	470										39.5	62	16
Cooper-town.....	Otsego.....	1250									35.5	35.2	60	5
Garrattsville.....	".....										35.0	35.8	61	5
New Lisbon.....	".....	1234									34.1	34.3	62	c
Oneonta.....	Otsego.....	1100									36.9	38.0	64	16
Perry City.....	Schuyler.....	1038									36.7	37.4	68	4
Straits Corners.....	Tioga.....											37.3	65	1
Waverly.....	Tioga.....	824									38.6	39.4	67	4
Dryden.....	Tompkins.....	1079										37.8	61	d
Mohonk Lake.....	Ulster.....	1245									37.6	39.4	63	7
Northern Plateau.....												33.0	67	5
Elizabethtown.....	Essex.....													..
Lake Placid.....	".....													..
Saranac Lake.....	Franklin.....											30.1	62	5
Gloversville.....	Fulton.....	850									34.2	34.5	62	4
Little Falls (2a).....	Herkimer.....	1526										35.2	67	5
||North Lake.....	".....											31.0	59	6
Lowville.....	Lewis.....	900										34.1	63	5
Number Four.....	".....	1571	30.05	30.55	28	29.37	9	1.18				31.3	59	5
Atlantic Coast.....												43.5	70	4
Brooklyn.....	Kings.....											44.5	67	16
Manhattan Beach.....	".....													..
New York City.....	New York.....	314	30.09	30.59	28	29.25	9	1.34	75			44.0	66	16
Willets Point.....	Queens.....											44.0	67	16

FOR NOVEMBER, 1897

TEMPERATURE — (IN DEGREES FAHR.).										SKY.		PRECIPITATION — (INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.		
12	23	49	15	38	4	1	12	4.1	6.6	19.3	13.2	3.77	1.75	<i>h. m.</i>	3	...	.....
18	<i>p</i>	45	15	32	4	5	30	2	8	20	11	3.07	0.55	.....	2	4.0	N. W.
15	<i>q</i>	49	19	38	4	7	13	3	6	21	15	4.69	0.99	.....	2	9.5	S. W.
15	28	50	15	35	4	3	30	4	4	22	19	5.00	1.10	16.00	2	11.6	S.	
15	30	50	15	30	4	4	26	2	6	22	21	4.83	0.80	.....	26	4.8	S. W.
17	30	42	11	25	27	2	13	2	3	25	15	6.52	1.12	.....	27	19.5	S. W.
18	30	45	13	27	4	3	13	2	3	25	15	6.52	1.12	.....	27	19.5	S. W.
15	24	52	14	31	4	3	12	9	0	21	9	2.89	1.10	.....	2	....	S. W.-W.
12	23	55	16	31	4	7	13	3	12	15	6	2.19	0.92	.....	2	....	.....
.....	.....	.....	.....	.....	.....	.....	.....	0	8	22	5	2.20	0.80	.....	2	....	W.
21	<i>r</i>	44	12	23	16	1	12	3	12	15	12	4.46	1.75	.....	3	5.0	W.
16	<i>r</i>	50	16	33	27	6	2	6	7	17	.....	2.79	.....	.....	.....	5.7	W.
13	<i>r</i>	51	16	32	27	4	13	5	12	13	15	3.10	0.82	.....	1	2.5	S. W.
14	24	50	15	32	4	5	2	9	9	12	14	3.10	1.00	24.00	1-2	1.5	S. W.-N. W.	
14	<i>s</i>	51	18	36	4	6	12	5	1	24	14	3.56	0.75	.....	1	6.8	W.
14	30	49	16	30	27	4	13	4	5	21	16	4.35	0.75	.....	1	9.9	.....
-2	24	55	16	42	27	2	2	5.3	7.9	16.8	14.1	4.32	2.92	.....	1-2	.....	.....
7	24	57	17	36	4	8	<i>aa</i>	2	10	18	15	2.89	0.67	.....	2	3.7	N. W.
11	24	55	16	36	4	5	13	2	10	18	15	2.43	0.54	.....	2	.....	W.
2	24	60	21	36	4	8	13	3	7	20	19	4.85	0.95	.....	2	8.5	S. W.
14	24	50	16	35	4	4	13	4	5	21	17	3.55	1.00	.....	2	.....	S. E.
3	24	58	20	40	27	7	13	2	.....	.....	9	4.35	1.38	.....	1-2	.....	.....
-2	24	64	17	38	4	5	13	3	5	22	12	4.34	1.00	.....	2	1.8	N. W.
15	24	47	12	25	26	3	13	8	12	10	9	5.05	2.92	.....	1-2	1.5	.....
13	24	49	14	28	4	3	23	7	4	19	11	5.71	2.43	.....	2	3.0	N. W.
8	24	52	12	26	4	2	2	4	9	17	15	5.21	1.50	.....	1	8.0	S.
5	24	56	17	37	27	6	2	9	8	13	18	5.23	.....	.....	.....	4.0	W.
-1	24	63	18	42	27	3	20	3	6	21	21	4.04	0.90	.....	1	9.2	S.
9	24	55	17	32	4	7	13	.....	.....	.....	14	5.03	1.41	.....	1	.....	.....
12	24	56	16	36	4	3	13	2	9	19	15	3.74	0.82	.....	2	3.0	S. W.
9	24	56	18	34	4	5	13	9	8	13	14	3.90	1.76	.....	1-2	3.2	S.
7	24	60	18	39	4	6	13	3	8	19	15	3.69	1.05	.....	2	2.8	N. W.
9	24	52	16	30	27	2	13	10	5	15	.....	.....	.....	.....	.....	.....	.....
15	24	48	14	33	27	4	13	9	13	8	7	5.10	.....	.....	.....	6.0	N. W.
-3	24	60	17	53	28	3	19	1.8	8.0	20.2	17.9	6.11	1.70	.....	2	.....	.....
0	23	62	18	37	21	5	13	3	9	18	14	4.74	1.00	.....	2	6.5	W.
6	24	56	15	39	27	3	19	3	8	19	17	6.79	1.45	.....	1	8.9	N. W.-N. E.
10	24	57	22	53	28	7	20	.....	.....	.....	20	6.78	1.70	.....	2	14.5	W.
-4	24	63	16	27	<i>ad</i>	6	14	1	8	21	10	10.24	3.85	9	26	13.0	W.	
-2	24	65	16	34	27	5	12	1	12	17	21	5.81	1.00	.....	9	12.0	W.
-3	24	62	15	38	27	4	12	0	3	27	14	6.45	1.13	.....	9	9.8	S.
9	24	50	16	40	4	2	23	7.3	10.8	11.9	12.6	4.77	3.00	24.00	1-2	.....	.....
21	24	46	11	19	16	2	22	8	10	12	14	3.66	1.57	22.00	1-2	1.5	W.	
21	24	45	12	30	27	6	12	6	10	14	13	4.44	1.28	.....	2	1.5	N. W.
21	<i>r</i>	46	16	32	4	6	26	.....	.....	.....	11	4.66	2.10	.....	1	1.0	N. W.

FOR NOVEMBER, 1897—(Continued).

TEMPERATURE—(IN DEGREES FAHR.).							SKY.			PRECIPITATION—(INCHES).					Prevailing direction of wind.		
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	Duration.	Date.	Total snowfall.	Prevailing direction of wind.
9	24	56	21	35	25	6	26	13	4	13	11	4.90	1.70	<i>h. m.</i> 22.60	1-2	2.0	N. W.
21	24	44	14	29	27	6	7	4	12	14	13	5.76	3.00	24.00	1-2	2.0	W.
11	24	59	18	40	4	4	13	8	12	10	16	5.30	2.47	24.00	1-2	3.8	W.
17	24	48	17	31	4	4	22	5	17	8	10	4.70	2.05	.....	2	3.0	.....
0	24	54	16	38	27	3	19	4.5	8.9	16.6	14.8	5.80	2.84	22.00	1-2	.....	.....
12	24	49	14	34	27	4	19	1	12	17	17	4.65	1.66	.....	2	4.5	S.
16	23	49	.....	.....	.....	.....	.....	4	6	20	18	4.77	1.55	.....	2	7.0	N.
5	24	57	15	26	24	4	2	3	11	16	14	5.07	1.50	20.00	1-2	4.2	N.
5	24	60	19	38	27	6	20	5	9	16	11	5.45	1.42	.....	2	2.0	N. W.
11	24	57	16	34	27	8	<i>bb</i>	5	10	15	17	7.24	2.84	22.00	1-2	5.5	N. W.
11	24	51	12	29	27	3	19	1	12	17	11	7.57	2.53	.....	1-2	6.0	S.
18	<i>t</i>	45	19	35	5	6	20	.....	.....	.....	12	5.40	.....	.....	.....	.....	N. W.
10	24	54	17	32	20	5	22	10	5	15	16	6.22	2.42	20.30	1-2	2.5	.....
0	24	61	17	34	28	6	<i>cc</i>	7	6	17	16	5.79	1.21	.....	2	6.0	S. W.
3	24	50	12	41	27	1	2	5.7	1.3	23.0	18.0	4.48	1.76	.....	1	.....	.....
12	23	51	12	34	16	2	1	3	0	27	14	4.80	.....	.....	.....	11.5	W.
15	24	45	12	25	26	1	2	11	0	19	19	3.83	1.00	.....	2	6.0	W.
3	24	57	14	41	27	3	2	3	4	23	19	3.04	0.76	.....	2	5.0	W.
10	23	47	12	28	16	2	<i>dd</i>	.....	.....	.....	20	6.25	1.70	.....	1	.....	.....
8	24	54	16	37	27	2	25	4.7	8.0	17.3	15.2	6.53	1.69	24.00	1-2	.....	.....
8	24	49	17	32	22	2	25	.....	.....	.....	13	3.58	1.00	.....	10	.....	W.
4	24	57	16	29	e	7	9	6	6	18	13	5.56	1.69	24.00	1-2	1.0	S.
3	24	57	16	37	27	6	<i>ee</i>	3	9	18	16	10.02	.....	.....	.....	6.6	N.
4	24	55	15	31	27	3	2	5	9	16	19	6.95	.....	.....	.....	9.5	S. E.
5	23	54	16	45	27	3	12	2.0	9.3	18.7	12.5	4.02	1.65	.....	12	.....	.....
9	24	58	18	37	22	10	<i>ff</i>	.....	.....	.....	13	2.66	0.42	13.00	26	7.4	S. W.
5	23	54	16	45	27	4	3	3	3	24	10	5.38	1.65	.....	12	1.0	S. W.
10	<i>r</i>	56	14	38	27	3	12	0	18	12	13	4.01	0.86	7.50	9	4.0	S. W.
10	<i>r</i>	48	17	35	27	7	19	3	7	20	14	4.01	.....	.....	.....	0.1	S. W.
13	24	46	13	31	27	2	17	2.6	8.0	19.4	17.3	4.84	2.75	.....	30	.....	.....
20	30	45	14	29	1	4	13	4	6	20	11	4.60	1.18	.....	26	2.0	S. W.
19	30	47	12	25	16	5	13	1	5	24	19	5.21	1.08	.....	26	.....	W.
19	<i>r</i>	46	14	29	<i>g</i>	5	18	4	5	21	18	3.54	0.65	.....	2	.....	N. W.
18	24	49	12	27	16	4	13	2	8	20	20	3.71	0.77	.....	2	10.1	S. W.
18	28	48	13	29	27	4	14	3	4	23	18	4.40	1.36	.....	2	3.3	N. W.
19	24	48	15	30	2	5	13	.....	.....	.....	10	3.69	1.00	.....	9	1.0	N.
13	24	51	15	30	27	4	<i>gg</i>	5	18	7	18	5.05	0.93	.....	1	.....	.....
20	24	46	13	31	27	5	17	2	15	13	18	5.02	1.98	.....	2	4.0	W.
20	23	45	12	25	4	4	1	2	5	23	21	6.56	1.40	.....	30	23.5	N. W.
22	<i>u</i>	42	15	31	27	5	<i>dl</i>	3	7	20	19	8.17	2.75	.....	30	42.8	S. E.
20	23	43	13	28	27	3	<i>hh</i>	2	9	19	17	3.46	0.63	.....	1	6.0	N. W.
22	30	41	12	27	16	2	17	1	6	23	19	4.63	0.77	.....	9, 26	.....	S.
14	24	50	15	33	27	2	13	5.7	6.2	18.1	12.3	3.48	1.48	24.00	2	.....	.....
15	23	53	16	32	27	5	1	10	11	9	16	4.49	0.32	16.00	1	6.0	N. W.
15	<i>r</i>	50	14	33	27	5	<i>jj</i>	3	5	22	5	2.68	.....	.....	.....	T.	S.
17	24	50	16	31	e	4	2	5	5	20	12	2.81	0.71	.....	1	3.4	N. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Central Lakes (Con.)														
Romulus.....	Seneca	719							83	32	...	40.0	64	b
Ithaca	Tompkins	810	30.66	30.57	28	29.10	9	1.47	76	32	38.6	39.4	63	b
Penn Yan.....	Yates.....											40.1	65	b
Mean.....	.....		30.06	30.64	28	29.06	9	1.39	78	33	...	37.6	70	4

* Mean of the tri-daily observations. † Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4, four hours. (1) Voluntary Observer. (2) U. S. Weather Bureau. (1a) City Reservoir; (2a) (a) 5, 6; (b) 4, 5; (c) 5, 16; (d) 2, 5; (e) 4, 16; (f) 4, 6; (g) 16, 27; (h) 26, 27; (j) 4, 26; (t) 24, 25; (u) 23, 30; (v) 4, 27; (w) 2, 13; (x) 12, 13, 25; (y) 2, 13, 30; (z) 13, 18; (aa) 1, 12, 13, 2, 13, 18; (kk) 1, 13; (ab) 2, 12; (ad) 17, 27.

FOR NOVEMBER, 1897—(Concluded).

TEMPERATURE—(IN DEGREES FAHR.).								SKY.				PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.		Mean daily range.		Date.	Least daily range.		Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	+ Duration.	Date.		Total snowfall.
17 14 16	7 24 23	47 49 49	15 13 15	32 31 31	27 27 27	6 2 3	kk 13 1	7 5 4	2 9 5	21 16 21	13 14 14	13 14 14	4.06 4.22 2.61	0.86 1.48 0.61	..... 24.00	1 2 1	4.1 1.5 5.0	W. S. E. S. W.-N. W.
-3	24	52	15	53	27	1	ab	4.4	7.5	18.1	14.7	4.81	3.00	24.00	1-2	5.9	W.	

Thermograph || Report received too late to be used in computing means. The means from the
† Blank indicates that the duration is not shown in the original records, but is within twenty-
Intake Conduit nine miles north of city. § For daily values omitted, see temperature table.
(k) 6, 7, 27; (m) 4, 5, 6; (n) 1, 5; (p) 23, 28, 30; (q) 28, 30; (r) 23, 24; (s) 24, 28;
14, 17; (bb) 19, 20; (cc) 7, 13; (dd) 12, 13; (ee) 2, 9; (ff) 3, 23, 28; (gg) 1, 7; (hh) 1, 18; (jj) 1,

TEMPERATURE — NOVEMBER, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau...</i>	49	47	46	48	53	47	43	40	44	39	35	34	33	35
Alfred.....	53	53	53	61	63	55	49	50	55	45	45	38	38	41
Angelica.....	47	41	38	29	45	37	35	27	33	32	36	30	30	31
Bolivar.....	53	52	55	63	61	61	44	50	58	41	44	37	35	39
Franklinville.....	45	43	38	25	35	35	32	25	31	30	34	29	28	27
Humphrey.....	52	50	54	65	65	59	46	50	51	44	43	38	32	38
.....	45	44	38	30	41	36	36	25	32	30	33	29	28	23
.....	49	47	56	65	63	54	47	49	52	42	41	33	32	35
.....	42	43	36	35	43	35	35	31	30	31	32	28	28	27
Arkwright.....	53	50	54	63	63	53	42	52	55	45	45	34	34	37
Jamestown.....	46	45	39	36	44	36	37	36	34	35	34	29	31	28
Elmira.....	55	60	56	66	65	67	53	53	56	48	50	40	37	42
.....	40	47	42	35	42	41	40	30	35	37	33	37	32	32
Avon.....	56	51	58	63	67	57	59	56	52	47	52	40	34	42
.....	48	43	35	32	45	40	40	38	33	31	33	32	31	32
Lockport.....	53	42	53	60	65	53	50	46	42	48	45	36	38	44
.....	49	40	40	40	43	39	37	36	35	35	36	35	34	38
Victor.....	54	46	52	60	66	62	54	43	54	46	49	38	36	40
.....	46	38	39	43	41	37	38	30	33	31	30	32	30	31
Wedgewood.....	51	56	52	64	63	52	50	45	55	45	43	37	34	44
.....	45	45	38	34	42	35	35	31	31	28	31	30	30	29
Addison.....	54	55	57	64	64	54	52	48	58	46	48	40	38	42
.....	48	50	41	31	37	40	40	31	40	33	34	34	33	33
South Canisteo.....	53	52	56	65	65	53	56	52	58	45	44	38	39	41
.....	50	40	34	29	36	34	34	26	35	29	27	32	29	27
Arcade.....	51	48	50	61	63	54	46	49	55	48	43	37	32	40
.....	45	41	37	32	44	35	31	29	30	31	33	29	28	25
<i>Eastern Plateau...</i>	49	54	45	46	56	47	42	36	45	36	37	37	34	34
Binghamton (1)....	55	63	53	64	63	56	48	45	56	47	45	40	39	38
.....	47	52	36	28	38	39	37	28	34	33	35	32	31	30
Binghamton (2)....	55	65	52	66	64	55	49	47	58	44	47	39	35	38
.....	49	51	36	30	44	40	34	28	35	34	31	32	30	31
Oxford.....	53	61	59	60	62	51	48	44	54	45	43	43	36	37
.....	40	46	38	24	31	35	25	20	35	30	22	22	28	26
Cortland.....	51	60	61	64	64	62	49	48	56	53	43	46	34	35
.....	44	50	40	29	40	40	40	30	39	35	28	35	30	29
South Kortright....	56	55	54	58	61	49	49	43	53	40	44	41	34	36
.....	41	48	37	26	37	33	34	18	35	29	19	30	27	24
Bouckville.....	52	61	57	60	62	58	44	39	56	41	43	45	33	35
.....	43	47	36	32	39	35	32	26	34	29	28	31	28	23
Middletown.....	55	58	55	62	59	60	50	45	57	47	45	45	37	42
.....	40	51	44	40	38	43	42	35	40	35	35	35	34	34
Port Jervis.....	57	59	55	61	58	59	50	50	54	47	50	46	45	46
.....	42	52	43	33	31	41	43	42	41	37	37	32	35	36
Cooperstown.....	50	55	51	58	60	50	42	38	52	38	42	40	33	32
.....	46	46	36	32	37	41	35	26	33	21	28	33	31	28
Garrattsville.....	54	53	51	60	61	52	41	40	53	42	44	43	38	37
.....	44	47	34	26	40	37	31	24	32	29	27	23	29	26
New Lisbon.....	51	58	51	60	62	53	43	40	53	40	43	40	33	35
.....	44	48	29	21	29	34	31	21	31	28	21	31	29	26
Oneonta.....	57	61	56	62	62	56	46	46	56	45	46	47	38	39
.....	36	48	36	30	35	38	34	6	31	32	26	33	31	28
Perry City.....	52	55	51	68	62	54	48	47	56	44	46	38	35	41
.....	44	46	32	32	39	42	27	25	34	30	27	32	32	29
Straits Corners.....	65	60	50	62	62	53	51	44	55	45	45	45	35	42
.....	47	47	31	28	36	37	38	25	34	26	28	32	30	31
Waverly.....	55	62	55	67	65	53	53	48	59	48	48	42	40	44
.....	44	52	35	28	34	40	40	27	43	30	28	33	34	33
Dryden.....	53	61	49	60	61	51	47	47	55	43	46	39	33	39
.....	45	48	34	31	43	36	31	26	32	33	32	32	31	29
Mohonk Lake.....	55	56	59	58	61	59	63	43	53	47	44	46	38	45
.....	43	49	44	40	45	40	41	36	37	35	35	35	34	30

REGIONS AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
42	46	31	29	32	46	50	35	23	25	36	49	38	27	29	22	38.5
53	59	34	33	42	57	58	44	31	32	44	58	53	39	36	23	38.7
37	33	27	25	24	36	43	29	18	19	31	42	25	18	22	18	38.0
52	60	35	34	41	57	59	50	36	32	44	59	57	37	36	30	38.0
33	31	25	22	20	30	42	28	16	17	27	37	24	15	21	15	37.6
51	60	33	31	40	59	57	42	30	29	43	55	55	38	32	22	37.1
34	33	27	24	22	33	45	28	16	16	27	40	24	15	20	19	37.1
53	58	32	32	39	59	52	42	26	33	43	56	52	36	32	21	38.2
30	31	25	24	25	36	40	26	18	17	28	41	24	20	19	15	38.2
55	60							24	33	44	58	45	40	34	24	39.2
35	34							20	22	30	43	28	24	23	18	40.6
47	60	42	35	40	57	65	38	29	31	40	59	35	41	40	30	40.6
34	34	30	27	25	39	46	29	19	15	34	50	27	20	30	21	40.4
54	60	40	34	42	56	59	45	29	36	42	62	56	34	36	35	40.4
36	32	30	26	24	34	42	29	12	22	29	42	31	18	24	20	39.0
53	57	36	35	42	56	56	39	31	37	47	56	32	29	35	29	38.6
38	34	29	29	30	38	39	29	21	21	33	34	25	23	22	22	38.6
53	64	35	34	36	54	59	41	26	36	39	60	56	34	37	27	36.9
31	35	28	26	25	33	40	25	16	16	33	36	23	19	22	18	40.3
44	57	34	33	35	55	62	43	30	27	35	57	53	35	36	26	40.3
32	30	23	20	19	32	42	23	13	13	26	34	21	16	19	14	37.9
48	57	38	36	41	58	62	49	31	32	41	61	56	39	40	26	37.9
36	37	30	27	26	35	42	30	18	14	31	41	29	19	26	21	36.9
52	61	35	31	40	58	61	43	30	31	40	59	54	36	38	24	36.9
31	32	24	22	18	32	43	28	17	14	27	35	25	14	22	16	37.4
52	58	32	30	40	57	56	41	29	31	42	57	53	37	34	21	38.1
35	30	25	23	22	35	41	27	15	15	27	41	23	15	18	14	38.1
38	48	32	28	28	36	43	36	23	20	31	47	38	24	30	23	39.0
46	60	35	32	35	45	62	45	29	30	40	62	57	36	41	26	39.0
35	37	27	21	22	33	33	26	12	7	25	40	24	9	26	17	36.0
51	63	35	33	36	47	61	42	28	31	41	61	56	35	39	26	38.2
36	34	25	22	23	34	40	26	16	11	28	40	24	17	22	19	35.4
42	61	48	35	35	38	57	52	33	33	37	57	56	39	37	34	35.4
28	37	27	18	17	26	35	23	15	2	18	30	23	13	20	13	35.4
40	61	41	33	32	45	45	58	31	30	32	56	56	32	36	33	39.5
32	39	28	23	20	30	30	24	21	14	24	31	26	17	22	18	39.5
47	61	41	34	35	42	55	52	30	27	41	58	59	32	39	30	39.5
25	31	25	22	19	25	35	24	12	3	20	28	19	11	20	15	39.5
39	62	39	32	29	38	55	48	28	28	33	55	56	31	36	26	39.5
24	32	24	20	20	27	33	20	13	-2	22	32	21	16	24	15	40.0
40	60	37	39	35	35	55	40	34	34	38	60	42	34	36	30	40.0
33	43	30	25	25	30	32	32	20	15	25	35	25	.....	19	....	40.0
45	62	39	38	35	39	54	41	36	33	38	60	36	35	35	32	39.5
37	39	30	20	24	25	34	38	27	13	21	35	28	17	22	19	35.2
45	56	32	28	35	38	55	30	25	28	37	55	55	31	36	25	35.2
35	35	28	26	24	29	30	25	13	8	25	37	20	15	21	20	35.8
45	59	35	34	33	40	51	46	29	32	40	58	55	32	39	27	35.8
23	34	24	23	21	29	35	23	10	5	25	34	18	14	22	19	34.3
44	62	33	30	30	39	56	43	28	30	38	58	58	26	37	26	38.0
28	32	25	21	20	26	29	22	12	-1	21	36	16	11	19	18	38.0
50	64	38	35	35	44	58	47	31	32	42	62	40	35	42	29	37.4
30	35	30	26	25	28	39	27	18	9	27	38	24	14	26	20	37.4
48	58	35	34	36	51	59	41	26	33	38	57	53	34	36	26	37.3
34	30	22	22	20	30	39	25	13	12	26	34	23	13	21	16	37.3
43	59	38	35	35	52	60	60	32	32	34	.....	50	35	36	27	39.4
33	34	20	20	19	28	36	34	15	9	21	.....	23	15	24	17	39.4
47	60	39	37	40	57	64	40	34	22	40	59	55	40	40	32	37.8
36	35	22	17	24	34	40	27	22	7	25	39	25	16	25	17	37.8
47	60	34	32	34	50	59	49	.....	32	39	58	54	33	37	26	39.4
34	32	23	22	20	32	41	22	10	9	26	38	24	17	21	17	39.4
45	58	41	40	31	35	56	53	29	31	34	55	57	33	35	30	39.4
33	41	30	29	26	26	32	27	19	15	23	43	24	19	25	20	39.4

TEMPERATURE—NOVEMBER, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau...</i>	43	46	43	41	48	45	34	30	36	33	31	35	32	28
<i>Lake Placid</i>														
<i>Saranac Lake.....</i>	17	50	41	59	62	46	31	37	46	51	40	35	27	31
	29	38	30	30	38	39	22	25	24	17	21	27	22	18
	70	50	50	62	59	52	39	36	50	40	39	40	36	39
<i>Gloversville</i>	38	46	40	35	29	38	35	26	31	29	22	35	32	27
	55	51	57	60	67	65	52	39	40	57	41	42	55	34
<i>Little Falls (2a).....</i>	28	40	10	31	33	37	32	25	27	28	22	29	28	25
	48	49	50	40	57	50	41	32	39	44	33	41	35	28
<i>North Lake.....</i>	32	43	39	31	33	39	31	20	25	27	23	28	27	22
	50	51	53	61	63	53	39	38	49	27	43	39	35	33
<i>Lowville.....</i>	14	41	37	32	37	37	31	21	34	28	24	31	29	25
	48	51	50	57	59	52	35	38	42	33	41	35	32	28
<i>Number Four.....</i>	42	44	32	30	43	32	26	21	28	25	32	31	25	21
<i>Atlantic Coast.....</i>	53	59	53	51	50	54	48	31	52	44	43	43	35	40
	61	63	60	58	60	62	55	50	60	51	55	45	45	47
<i>Brooklyn.....</i>	48	56	50	42	45	48	42	45	50	39	38	40	38	36
	61	61	60	60	59	60	54	56	60	51	55	44	44	44
<i>New York City.....</i>	52	54	49	47	45	47	43	45	49	39	41	38	38	36
	65	64	62	67	61	61	55	55	60	54	55	46	45	47
<i>Willet's Point.....</i>	51	51	39	35	47	42	41	42	29	34	38	39	37	37
	63	64	63	65	61	62	54	49	59	60	55	48	45	47
<i>Brentwood.....</i>	36	55	43	31	31	46	39	39	45	39	24	33	36	28
	63	65	61	60	62	63	53	50	60	50	55	52	48	46
<i>Setauket</i>	46	56	49	46	42	47	47	40	46	49	34	42	39	37
	60	62	60	70	63	61	54	47	57	52	51	47	44	48
<i>Bedford.....</i>	42	54	43	20	22	45	44	39	42	34	26	39	37	32
	62	64	62	63	60	62	57	49	58	52	51	48	46	48
<i>Primrose.....</i>	38	50	41	32	31	46	41	33	43	38	27	38	37	34
<i>Hudson Valley</i>	49	53	48	46	48	51	44	36	45	40	38	40	39	36
	54	55	54	61	61	60	44	42	54	45	46	45	40	40
<i>Albany</i>	43	46	42	38	36	44	36	32	38	32	30	36	35	31
	57	55	55	58	58	60	51	42	53	47	47	47	44	41
<i>Honeymead Brook..</i>	43	51	42	32	35	45	35	28	40	31	25	39	36	29
	59	57	60	65	59	64	54	41	55	51	49	48	46	46
<i>Poughkeepsie</i>	38	50	34	29	33	45	34	27	40	15	24	39	37	31
	60	68	58	56	62	58	52	44	54	50	59	40	45	45
<i>Wappingers Falls ..</i>	40	50	42	32	44	42	40	31	42	32	31	30	30	35
	54	54	53	59	59	62	48	41	49	50	46	46	44	44
<i>Catskill</i>	45	50	47	38	42	46	34	31	43	37	28	40	38	33
	52	61	58	59	61	56	60	54	50	52	48	48	46	42
<i>West Point.....</i>	35	36	36	26	26	34	35	26	26	28	28	26	27	35
	58	64	55	62	61	56	52	44	55	49	48	44	42	44
<i>Carmel.....</i>	41	54	43	34	40	46	38	24	39	34	32	38	35	20
	52	54	53	57	60	57	43	42	50	.....	47	44	40	38
<i>Greenwich.....</i>	42	43	45	37	32	43	37	24	36	.....	23	33	34	26
<i>Mohawk Valley.....</i>	48	48	43	47	47	45	38	35	40	37	31	37	32	32
	50	51	45	63	58	49	40	39	43	41	40	43	31	32
<i>Little Falls (2a).....</i>	48	41	37	40	43	35	29	31	31	32	28	31	24	26
	55	52	45	45	52	56	47	47	52	43	43	45	41	37
<i>Canajoharie</i>	43	51	43	42	37	43	37	29	39	34	29	37	33	30
	52	52	51	59	59	52	43	40	50	47	40	40	36	35
<i>St. Johnsville.....</i>	41	49	41	34	33	41	37	27	36	31	23	34	31	29
	48	59	45	57	55	49	42	40	34	40	39	33	31	36
<i>Rome</i>	44	41	35	38	41	35	26	30	31	27	30	31	29	29
<i>Champlain Valley ..</i>	45	45	44	44	46	49	41	33	39	36	33	37	35	34
	47	50	50	50	55	57	57	38	42	43	29	43	42	36
<i>Plattsburgh Bar'cks.</i>	37	27	27	30	35	37	37	27	30	29	24	23	25	26
	51	51	52	60	61	57	47	42	45	47	43	42	41	45
<i>Ticonderoga</i>	39	42	44	31	34	48	39	25	38	33	23	34	33	24
	50	50	51	58	60	52	42	38	42	41	40	45	40	40
<i>Glens Falls</i>	40	44	36	28	31	41	30	23	36	26	22	33	30	29
	51	50	50	59	59	59	47	41	42	46	45	45	40	40
<i>Lake George</i>	46	47	40	33	36	44	30	27	37	27	25	33	34	28

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
31	42	32	23	22	28	36	30	17	16	28	41	34	24	25	20	32.7
51	56	39	24	25	47	51	27	18	32	49	57	23	32	36	22	30.1
23	23	13	13	16	20	14	14	0	16	32	21	8	12	12	11	
39	15	37	33	26	31	47	43	30	31	32	60	57	31	34	27	34.5
25	37	27	24	23	22	30	25	12	6	19	31	18	13	19	18	
35	47	57	35	34	29	34	49	35	29	35	50	57	65	35	35	35.2
21	30	24	20	20	22	25	21	11	10	15	25	28	12	12	13	
31	50	52	28	26	34	43	50	28	22	26	47	53	27	29	32	
19	31	25	14	14	18	26	18	12	-4	12	26	26	10	11	12	31.0
38	57	35	28	27	35	52	47	24	39	35	55	55	32	35	29	
25	34	26	14	18	24	33	18	10	-2	25	34	21	15	24	13	34.1
39	54	32	25	25	38	49	31	23	27	34	54	52	28	32	24	
20	31	23	15	15	20	34	16	5	-3	22	34	14	13	21	8	31.3
44	54	40	34	35	37	46	44	31	27	38	52	42	32	38	30	43.5
51	67	47	42	43	53	47	37	34	46	58	46	35	46	46	34	
40	48	36	31	33	37	40	45	26	21	31	46	33	24	33	25	44.5
50	66	40	40	40	41	56	55	37	34	48	59	59	35	49	32	
38	38	34	30	32	35	40	35	22	21	32	48	29	26	31	25	44.0
53	67	44	41	44	55	47	38	39	54	58	56	40	47	33		44.0
38	36	30	31	32	36	40	30	21	21	34	52	27	28	25	23	
51	63	46	42	41	56	59	38	41	53	58	55	48	47	38		42.6
36	44	35	18	23	22	32	12	24	9	18	52	28	24	34	24	
53	63	56	41	41	46	58	53	33	35	47	60	60	37	47	41	45.3
39	49	37	32	33	56	35	39	26	21	30	46	31	27	36	27	
48	65	53	43	37	53	57	53	49	39	42	56	58	41	43	39	42.0
34	47	31	25	25	29	34	35	22	11	25	38	29	19	29	23	
51	65	46	42	39	41	55	46	40	37	48	60	49	36	41	35	
37	44	32	24	26	31	38	42	29	17	28	37	33	19	26	24	42.2
37	50	38	32	30	33	42	39	26	21	31	46	43	29	30	28	38.9
46	59	40	38	30	36	51	48	33	32	38	61	58	35	37	30	
31	40	29	29	26	28	36	28	15	12	28	37	24	29	28	25	39.0
43	62	42	37	33	36	54	36	31	31	39	57	39	34	38	32	
32	38	28	24	24	28	35	28	17	5	24	37	21	18	21	21	37.9
42	62	42	43	35	36	58	51	33	36	40	62	63	35	37	36	
53	39	27	21	26	30	31	29	18	5	24	36	25	17	22	22	39.2
49	60	40	41	37	38	50	52	35	32	45	60	62	35	36	34	
31	40	30	26	29	30	40	32	22	11	25	35	28	20	20	22	40.0
43	59	42	37	30	35	51	45	30	34	37	58	56	38	35	33	
32	41	36	29	27	29	35	30	20	11	27	35	27	20	25	25	39.6
45	52	63	42	40	36	38	62	46	39	34	46	61	50	40	40	
36	37	35	27	29	30	31	38	27	18	18	30	44	22	24	23	29.8
45	61	39	39	35	55	56	38	30	35	42	58	54	38	40	35	
31	42	29	24	22	24	29	32	18	10	22	35	28	21	25	22	29.4
41	61	54	33	30	34	45	45	30	25	37	59	61	49	35	33	
26	39	30	21	22	24	25	26	15	0	19	35	29	15	20	11	36.6
36	42	31	30	26	33	37	29	20	21	35	48	30	25	28	24	35.2
43	59	31	31	26	33	50	29	23	31	53	61	33	29	34	22	
31	25	22	27	21	26	23	16	12	14	28	50	15	21	18	15	34.2
42	42	40	36	33	39	47	47	32	30	35	60	40	32	38	32	
32	40	32	28	27	30	36	28	18	15	25	35	26	21	27	23	37.1
38	55	37	34	27	33	43	45	30	30	33	60	60	30	33	33	
25	35	27	24	23	25	25	21	12	3	24	32	19	14	24	20	35.4
50	56	35	34	30	38	49	30	27	30	50	57	30	30	35	27	
30	28	26	24	25	28	23	12	10	18	30	30	18	22	20	19	34.0
37	43	34	28	24	37	39	34	22	15	30	43	42	24	27	23	35.1
37	47	53	33	27	34	38	51	30	29	32	18	57	33	52	36	
24	27	27	20	18	13	23	19	19	8	30	18	32	14	15	16	33.0
59	55	33	35	32	42	49	49	26	31	38	57	59	38	40	42	
39	28	24	25	20	24	40	24	17	4	21	36	30	15	20	16	37.4
39	54	38	33	28	32	45	33	32	25	35	57	57	30	33	28	
26	37	27	21	21	23	32	26	10	3	18	35	20	13	18	10	34.1
41	55	40	35	28	35	47	48	30	27	36	57	57	32	36	26	
27	40	28	23	22	26	35	26	10	4	24	34	23	13	19	12	36.0

TEMPERATURE — NOVEMBER, 1897, SHOWING DAILY MEANS FOR
STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Val...</i>	46	42	42	48	49	46	38	33	36	34	34	38	34	32
Madison Barracks ..	56	53	46	52	63	67	52	46	43	50	46	50	42	39
	38	37	36	37	43	44	33	26	28	31	26	34	30	26
Canton	50	45	41	50	58	49	40	26	38	35	40	40	33	35
	40	36	37	36	31	32	26	22	32	27	34	32	28	23
North Hammond...	50	40	56	64	66	48	44	40	38	44	40	39	38	44
	40	36	36	40	31	40	32	30	30	22	30	36	32	30
Ogdensburg	54	50	48	58	55	56	41	42	47	35	42	44	39	34
	40	35	33	36	37	32	32	25	31	27	27	32	28	24
<i>Great Lakes.....</i>	52	47	47	52	55	48	42	40	42	41	40	37	36	35
Westfield	57	55	54	65	65	59	48	53	57	50	45	42	38	43
	48	44	41	42	49	37	39	36	35	38	37	34	34	31
Buffalo.....	57	50	51	61	66	54	47	48	44	47	46	37	37	40
	50	42	41	49	54	42	38	36	33	35	37	32	32	32
Pittsford.....	55	51	55	65	55	57	50	44	50	48	47	40	40	40
	48	43	40	41	38	39	35	32	32	33	37	32	31	32
Rochester.....	54	49	55	66	67	56	50	44	50	46	47	39	36	39
	49	41	41	43	48	38	36	36	34	34	38	32	32	32
Appleton.....	54	52	57	61	66	55	49	46	45	47	45	42	40	38
	49	43	42	40	43	41	33	31	36	37	35	33	35	34
Fort Niagara	67	54	60	62	67	60	50	48	46	49	46	44	40	40
	50	40	40	42	47	40	37	35	33	37	36	30	35	30
Baldwinsville	52	55	50	64	61	56	48	42	52	47	47	41	38	38
	48	45	40	40	40	39	34	20	34	32	30	32	32	28
Ridgeway	55	51	55	63	66	59	51	44	45	47	45	42	40	40
	48	41	41	43	44	38	34	35	35	34	37	32	33	34
Oswego	52	54	50	65	65	57	46	42	54	42	45	42	38	37
	48	42	41	40	47	38	26	33	34	35	33	36	33	31
Palermo	56	53	50	60	64	55	45	40	51	42	42	40	38	38
	46	42	40	32	42	38	37	27	35	33	30	35	33	29
Lyons.	55	52	53	63	63	57	50	45	56	47	46	49	37	39
	50	44	43	40	46	41	35	33	36	36	36	34	32	30
Erie, Pennsylvania.	51	51	54	66	65	50	47	53	52	48	48	39	38	40
	48	42	41	44	48	37	39	38	36	39	34	30	35	32
<i>Central Lakes.....</i>	50	50	46	52	56	47	43	39	46	40	40	38	34	36
Auburn	53	58	50	68	68	55	50	45	58	47	47	40	34	42
	48	45	37	38	47	38	32	30	33	31	31	32	30	25
Fleming	53	52	49	64	65	55	46	45	55	44	46	47	35	38
	48	47	40	41	48	39	38	34	35	32	35	32	30	29
Watkins	53	51	55	67	66	55	52	48	60	48	48	41	38	43
	48	47	42	36	46	38	39	30	35	34	32	31	23	34
Romulus.....	53	52	52	64	64	57	50	47	57	48	48	44	38	41
	47	45	41	39	43	38	37	33	34	34	34	34	32	31
Ithaca	53	54	51	63	63	55	48	47	58	45	47	41	37	40
	48	49	40	35	49	41	37	31	35	36	35	36	35	33
Penn Yan	52	52	54	65	65	56	50	47	58	47	48	42	38	40
	49	46	42	39	45	38	33	31	34	34	34	30	33	33
Mean.....	48	49	46	48	50	48	41	37	42	38	36	38	34	34

‡ Max. and Min. by the Draper Thermograph. § Received too late to be used in computing
Conduit, nine miles north of city.

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Concluded.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
34	45	33	26	23	26	41	29	20	22	35	48	35	26	30	23	34.8
36	59	58	36	32	31	51	55	31	25	37	51	51	28	39	36	36.3
24	34	29	17	19	19	28	18	21	9	20	29	24	18	22	17	
41	58	32	29	25	32	55	35	26	38	38	59	55	36	38	25	32.6
24	29	22	18	16	16	26	15	5	6	30	37	10	15	23	14	
50	60	36	34	23	36	56	36	24	44	54	58	58	36	34	26	36.2
24	36	26	24	20	24	34	20	10	10	30	52	20	22	26	20	
42	56	38	29	24	29	53	35	35	38	40	58	50	35	38	29	34.2
27	30	24	18	17	19	26	20	10	10	30	37	15	15	22	15	
45	48	33	32	33	44	49	35	25	28	38	49	38	31	31	24	39.9
59	63	37	37	46	60	59	44	33	37	47	60	55	42	42	25	42.0
38	35	31	30	32	41	42	31	24	25	34	35	29	28	24	20	
59	59	36	33	45	56	56	28	29	36	50	58	34	40	38	27	40.0
40	34	30	28	29	44	38	29	22	23	36	34	26	24	21	19	
55	62	39	33	38	57	59	39	30	34	42	62	54	39	38	26	39.6
36	33	29	28	28	24	40	27	19	19	33	41	25	24	22	20	
56	62	35	33	38	56	59	36	28	33	46	61	36	39	36	25	39.0
37	35	28	23	28	36	39	27	19	18	33	36	25	24	23	20	
53	60	38	36	38	55	57	44	34	35	44	58	54	40	36	29	40.3
36	37	31	31	29	35	40	30	22	20	31	40	25	18	28	22	
61	55	40	36	41	57	59	47	34	35	45	60	56	44	42	31	41.5
41	35	28	28	28	40	45	30	22	19	34	40	26	24	22	20	
45	62	40	34	34	40	59	42	27	35	43	59	56	37	38	29	38.4
32	35	27	27	26	27	34	24	15	13	30	40	26	23	23	20	
52	61	36	34	39	56	58	45	31	33	44	60	56	32	37	28	40.1
35	34	31	28	28	35	44	29	21	20	31	44	25	21	25	21	
47	61	35	33	31	40	58	36	28	32	40	59	45	36	33	23	39.0
34	38	30	28	25	30	36	26	20	20	31	40	26	26	28	22	
42	60	38	34	29	38	56	45	26	35	36	57	57	34	35	26	36.7
31	36	28	24	23	27	35	23	17	18	26	35	26	25	25	17	
51	58	37	34	37	53	60	44	30	35	42	59	56	37	39	28	40.6
35	36	31	31	30	35	43	29	20	23	34	41	28	24	26	23	
62	63	36	37	47	60	58	40	33	36	54	61	57	43	38	25	42.0
40	36	34	33	32	44	40	33	26	26	36	37	30	27	24	22	
42	47	35	31	31	45	52	36	24	25	34	48	41	29	31	24	39.6
48	60	38	35	35	54	62	45	35	34	38	57	55	43	35	31	39.1
32	32	27	25	26	34	44	25	15	17	29	37	23	20	23	18	
47	60	38	32	34	52	59	45	30	32	39	58	57	38	36	28	39.0
34	35	30	27	25	33	43	26	15	15	28	37	24	22	21	19	
47	61	29	26	39	59	63	48	29	34	38	60	57	38	41	28	40.1
37	34	29	25	23	36	43	29	18	17	28	38	26	19	27	19	
51	60	38	36	35	53	62	48	31	35	40	60	57	39	38	29	40.0
37	34	29	24	26	33	43	26	17	17	31	39	25	21	25	20	
47	59	56	35	37	53	61	43	29	31	36	59	57	34	36	27	39.4
37	34	28	27	25	36	44	27	19	14	28	36	26	19	25	21	
49	58	38	35	37	58	62	44	29	32	41	60	57	37	38	29	40.1
38	35	28	26	27	35	43	27	16	17	31	41	26	20	29	20	
39	46	34	29	28	35	44	35	23	22	34	47	38	27	30	24	37.6

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City reservoir; (2a) Intake

DAILY AND MONTHLY PRECIPITATION

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau.</i>	0.61	0.67	0.01	0.00	0.01	0.12	0.00	0.12	0.45	0.03	0.11	0.19	0.02	0.01
Alfred														
Anglican	.53	.55				.09		.01	.25	T.	.12	.10	T.	T.
Bolivar	.68	.90				.09		.06	.27	T.	.15	.38	T.	T.
Franklinville	.59	.51	.01			.19		.03	.52	.02	.14	.43	.11	T.
Humphrey	.18	.67	.04		.12	.11		.15	.50	.04	.15	.50	.05	.04
Little Valley														
Napoli	.61	.35	.07		T.	.22		.05	.55		.08	.50	.07	T.
Cherry Creek	.51	.11	.10		T.	.37		.07	.50	T.	.16	.61	.08	.06
Jamestown	.54	.32	.04			.32		.08	.35		.25	.45	T.	T.
Elmira	.38	1.10						.10	.14		.13			
Pine City	.75	.70	.11					.30	.21	.10	.12	T.		T.
Akron	.15	1.35	T.			T.		1.04	.24	T.	.21	T.	.05	T.
Aron	.39	.92				.22		.18	.28	T.	T.	T.	T.	
Mt. Morris	.70	.80				T.			.50		T.		T.	
Nunda														
Lockport	.20	*	+1.75			.10		.03	.73	.15	.16	.18	T.	T.
Victor														
Wedgewood	.82	.70	.10			.03		.03	.39		.10	T.	T.	
Adrian	.70	.72	.10			.04		.03	.45		.07	.04		T.
Atlanta	.60	.45	.02			.05		T.	.68	.11			T.	
Hasbrouckville	.70	.42	.10			.10		T.	.50		.08	.05		
South Canisteo	.75	.41	T.			.10		.22	.30	T.	.15	.05		T.
Arcade	.75	.56	.08		T.	.29		T.	.56		.10	.33		
<i>Eastern Plateau.</i>	0.50	0.54	0.06	0.00	T.	0.05	0.02	0.14	0.38	0.04	0.23	0.02	0.06	T.
Binghamton (1)	.55	.67	.04					.10	.63		.45	T.	.05	
Binghamton (2)	.52	.54	.02			T.		.94	.37	T.	.05	T.	.02	T.
Chemung Forks														
Oxford	.69	.95	.17			.07		.10	.49		.14	.08	.05	T.
Cortland	.66	1.00	.05			.11		.04	.20	.02	.07	.10	.02	
South Kortright	*	+1.88						*	+1.80		.42			
Buckville	.88	1.00	.07			.15		.26	.32		.11			
Fayetteville	.91	.90	.22			.20	.08	.06	.46	.01	.01	.05	.50	
Shadyside	*	+2.92						*	+1.75		.32			
Port Jervis	.28	2.43							.14	.73	.37			
Warwick	.43	1.50						.15	.55		.43			
Cooperstown	1.50	.33				.07	.13	.15	.45		.38		.20	
Garrattsville	*	+1.20					.18	.05	*	+1.45	.36		.20	
New Lisbon	.90	.75	.04			.06	.01	.16	.40	.01	.16	.63	.02	.02
Oneonta	1.41	.11			.01			.41	.53		.24	.04		
Schenectady	.92	.93	.04			.08	.11	.09	.73	.06	.25	.06	.10	T.
Perry City	.80	.82	.30		.03	.05		T.	.27		.10	T.		
Newark Valley	.98	.86				.04		.08	.50		.10	T.	T.	
Straits Corners	.93	.83	T.			.09		.02	.65		.06	.04	.02	
Waverly	.73	1.05	.03			.05		.17	.62		.12	T.		T.
§Dryden	.58	1.26	.20			.04		.05	.20	.02	.09	.02	.03	
Mohawk Lake	*	+2.82						.83			.52			
<i>Northern Plateau.</i>	0.50	1.28	0.16	T.	0.02	0.22	0.12	0.04	0.92	0.09	0.27	0.26	0.03	0.02
Elizabethtown														
Lake Placid														
Saranac Lake		1.00	.14		.17	.19			.98	T.		.58		.03
Gloversville	1.45	1.03	.04			.14		.23	.93		.43	.28	T.	
Little Falls (2a)		1.70	.41	.02		.10	.15	T.	.22	.55		.25	.12	.10
North Lake		1.27	.31			.69			.87			.30		
Lowville	.25	.77	.04			.43	.09	.05	1.00	.06	.37	.34	.09	
Number Four	*	*	+1.45				.63		1.13	.03	.37	.09		
Kings Station	1.30	1.90							1.35		.75			
<i>Atlantic Coast.</i>	0.91	1.43	0.00	0.00	T.	T.	0.00	0.16	0.26	0.00	0.41	0.06	0.00	0.00
Brooklyn	.98	.59						.09	.27		.41	.08		
Manhattan Beach														
New York City	.88	1.38						.09	.18		.56	.07		
Willels Point	2.10	.10						.22	.10		.42			

STATION FOR NOVEMBER, 1897—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.10	0.35	0.02	T.	T.	0.00	T.	0.09	0.20	T.	0.06	0.47	0.10	T.	0.07	0.06	3.92
.01	.39	T.	T.				T.	.30		T.	.51	.10		.10	T.	3.07
.10	.56	T.	T.				.02	.26		T.	.85	.16		.04	.08	4.69
.0.	.34	T.	T.				.10	.60	.01	.07	1.00	.18		.14	T.	5.00
.28	.13	T.					.32	.02		.21	.80	.18		.23	.01	4.83
.09	.57	.07	T.				.10	.31	.02	.04	.74	.19		.12	T.	4.95
.12	.56	.06					T.	.28	.05	.15	1.36	.16		.17	.10	6.41
.60	.43						T.	.60		.81	1.12	T.		.20	.70	6.52
.04	.40							.22			.08					2.89
.10	.30	.19	T.				T.	.26	T.	T.	.06	.21		.04	T.	3.53
.05	.65	.07	T.	T.		T.	T.	T.	T.	*	1.00	T.	T.	T.	T.	5.09
.10	T.	T.	T.			T.	.10		T.	T.	.10		T.			2.19
													T.			2.20
T.	.66			T.			.20	T.		T.		.10		T.	.20	4.46
.07	.32	T.		T.			.13	.10		.03	.28	.09		.04		2.79
.06	.37						.05	.16		T.	.12	.16	T.	T.		3.10
	.30							.22			.08	.30				2.81
.05	.30						.10	.22		T.	.28	T.		T.	T.	2.90
.10	.25		T.			T.	.40	.08		T.	.60	.05		.10		3.56
T.	.43	.05				T.	.17	.15		.08	.58	.05	T.	.12	.05	4.35
0.08	0.25	0.05	0.05	0.10	T.	0.03	0.05	0.18	T.	0.16	0.27	0.16	0.02	0.10	T.	4.29
T.	.10	.20					.02	.30		.06	.20	.04		.08		2.89
.02	.18	T.	T.	T.			.06	.21		.15	.12	.11		.02		2.43
.05	.16	.22	.05	.08				.45		.15	.56	.22		.17		2.50
	.43		.10	.02				.08		.36		.04		.25		4.85
	*	†.34	.11				.38			*	†.79	.35		.13		3.55
.04	.25		.03	.06			.05			.30	.43	.35		.02	.02	4.35
.02	.38	.04		.08	.04		.02	.25		.30		†.42		.07		4.34
.50	.02	T.					.15	T.		*	†.24			.15		5.02
											†.24					5.05
.33	.15							.20			.33	.60		.15		5.71
.16	.09	.10						.10			.50			.06		4.07
.04	.39		.18	.11			.27			.41	.43			.17		5.21
.18	*	†.59		1.00			.20	T.		.26	*	†.38		.37		5.23
	.31		.07	.15			.03	.21		.15	.20	.26		.10		4.04
	.26		.16	.21		.69				.36	.41			.06		5.03
.03	.44	.18	.04	.08			.27			.12	.35	.49		.15	.06	5.58
.04	.40	T.		.07			.18			.10	.36	.19		.03		3.74
.08	.27	T.	T.			T.	.28			.10	.30	.23		T.		3.82
.66	.28	T.	T.				T.	.30		.06		.16	.40	T.		3.90
.03	.2	T.		T.		T.	.11	.15		.08	.09	.23		.03		3.69
.05	.53	.03		.03				.27		.18						
	.33		.30					.30								5.10
0.05	0.58	0.06	?	0.11	0.15	0.01	0.03	0.08	T.	0.10	1.43	0.17	0.01	0.32	0.05	6.99
	.39	*	†.10	.04	T.			.03	T.	.27	.78	T.	.04			4.74
.14	.22	T.	T.	.29	.05		T.	.10	T.	.18	.67	.23		.28	T.	6.79
	.14	.25	T.	.01	.57	.04	T.	.16	T.	T.	1.04	.50		.10	.35	6.78
	1.95				.20		.10				3.85			.70		10.24
	.26	.11		.12	.06		.10			.14	.71	.47		.32	.03	5.81
*	†.72			*	†.18		.12			*	†.25			.48		6.45
.15	.40		.20	†.18			.20				1.55			.25		8.15
0.15	0.09	0.08	0.00	0.01	T.	T.	0.00	0.18	0.00	0.01	0.45	0.48	0.00	0.12	0.00	4.77
.12	.01	.16						.20		T.	.13	.50		.12		3.66
.13	.04	.10						.14		T.	.18	.60		.09		4.44
.18	.17							.10		.05	1.10			.12		4.66

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atlan. Coast (Con.)</i>														
Brentwood.....	*	1.70						.20	.40		.50			
Setauket.....	.58	2.50						.05	.40		.42	.14		
Bedford.....	.48	1.99			T.	T.		.10	.39		.58	.11		
Primrose.....	.42	2.05						.39	.11					
<i>Hudson Valley</i>	0.79	1.57	0.01	0.00	T.	T.	0.01	0.14	0.70	T.	0.50	0.19	0.01	0.04
Albany.....	.40	1.66	.03			T.	T.	.09	.69		.18	.43		
Cedar Hill.....	.48	1.55	.05			T.		.14	.86	T.	.38	.40		
Honeymead Brook.....	.69	1.31									.57	.41		
Poughkeepsie.....	.95	1.42			T.			.12	.55		.56	.08		
Wappinger's Falls.....	1.12	1.62	.06					.20	.45	T.	.71	T.	T.	.....
Catskill.....	*	12.53				T.		.70	1.65		1.08			
West Point.....	*	12.00							1.80		.70			.40
Boyd's Corners.....														
Carmel.....	*	1.42						*	1.84		*	1.85		
<i>Southeast Reserve</i>														
Eagle Mills.....	1.10	2.00					.10		1.00		.10			
Easton.....	.96	1.82									.62			
Greenwich.....	.65	1.21	.02			.02		T.	1.13		.12	.56	.14	
<i>Mohawk Valley</i>	1.14	0.53	0.02	0.00	0.10	0.12	0.01	0.20	0.26	T.	0.24	0.08	0.01	0.00
Little Falls (1a)....	1.52	T.			.10	.13		.21	.15		.44	.14		
Canajoharie.....	.82	1.00			.02	.01		.20	.45		.30	T.	T.	
St. Johnsville.....	.52	.76	.07			.08	.02	.12	.17	T.	.11	.01	T.	
Rome.....	1.70	.35			.30	.28		.25	.26		.12	.17	.04	
<i>Champlain Valley</i>	0.29	1.14	0.20	0.02	0.02	0.06	0.02	0.02	0.72	0.27	0.29	0.62	0.04	0.00
Plattsburgh Barr'ks.....	.10	.60	.55	.10		.08	.06		.03	1.00		.50	.08	
Ticonderoga.....	.48	1.69	.04			.06			.70	.07		.99	.04	
Glens Falls.....	*	12.98				.04		.04	1.19		.46	.51		
Lake George.....	*	*	12.88			.05	.02	.05	.95		.71	.48	.03	
<i>St. Lawrence Valley</i>	0.39	0.37	0.19	T.	0.01	0.11	0.00	0.11	0.44	0.02	0.18	0.59	0.01	0.01
Madison Barracks.....	.38	.12			.05	.05		.33	.26		.11		T.	
Watertown.....														
Canton.....	.51	.39	.14							.10		1.65		
DeKalb Junction.....	.32	.61	.16			.30		.23	.43		.10	.59	.03	
North Hammond.....	.36	.36	.21			.29		T.	.86		.50	.12		
Ogdensburg.....	*	1.36	.45	.02		.01		T.	.64		*	1.60		.04
Potsdam.....														
<i>Great Lakes</i>	0.39	0.81	0.10	T.	0.02	0.13	0.03	0.12	0.60	0.06	0.14	0.14	0.04	0.02
Westfield.....	.60	.85				.40	.21	.40	.21	.30	T.			.10
Buffalo.....	.32	.95	.04		.02	.05		.05	.89	.02	.31	.04	T.	T.
Adams Centre.....		.94	.33			.27	.19		.12	.26		.04		
Pittsford.....	.41	.65	.12		T.	.22		.06	.65		T.	.25	.01	
Rochester.....	.42	.77	.01			.15	T.	.02	.75		.01	.23	.15	T.
Scottsville.....	.60	1.15				.60			.60			T.	T.	
Appleton.....	.16	1.36	.04		.01	.06		T.	.89	.06	.10	.08		T.
Fort Niagara.....	*	*	11.30		*	1.10			1.00					
Niagara Falls.....	.23	1.07			.06	.09		.01	.93	.04	.43	.06	T.	
Baldwinsville.....	.93	.49	.04		.08	.18		.34	.46			.21	.08	
Lyndonville.....	.18	1.67	.05			.11	.09	T.	.66		.16	.28		
Ridgeway.....	.18	1.98	.06			.07		T.	.70		.19	.29	.01	
Fulton.....	.55	.45				.20		.57	.40	.02	.20			
Oswego.....	.54	.25	.01			.12	.05	.03	.84		.22	.25	T.	
Palermo.....	.06	.50	.45			.09		.36	.44	.20	*	1.30	.15	
Phoenix.....	.08	.72	.47	.05		.09	.09		.36	.50		.14	.09	.03
Lyons.....	.63	.18	.03		.08	.08		.28	.20	.01	.08	.29	T.	
Rose.....	.61	.22	.01			.20	.22	.08	.49		.08	.37	.27	
Erie, Pennsylvania	.57	.46	.17		.03	.35		.04	.77	T.	.37	.02	T.	.17

TATION FOR NOVEMBER, 1897—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
.20	.20							.20			.30	.70		.20		4.90
.09	.04	.14		T.	T.			.29		T.	.21	.84		.06		5.76
.12	.11	.14		.08		.01		.28		.04	.16	.61		.10		5.30
.21	.08							.06			1.10	.12		.16		4.70
0.09	0.20	0.11	0.01	0.08	0.05	0.01	0.09	0.12	0.00	0.07	0.38	0.36	0.00	0.10	0.01	5.73
.01	.18	.01	T.	.15	.06			.20		.06	.05	.38		.07	T.	4.65
.02	.14	.01	T.	.13	.02	.06		.19		.04	.05	.20		.05		4.77
.08	.24	.10		.10	.02		.05	.25		.20	.37	.68		T.		5.07
.18	.21			T.			.34			*	†.89			.15		5.45
.38	.26	.42	T.	.10	.12		.10	.15		.12	.65	.62		.16	T.	7.24
.07	.03	.05	.10	.10	.12		.40	T.			.55	.05			.14	7.57
.20	.10			T.			.05			.20	.80			.15		5.40
.09	.19	.27		.06				.11		*	†.32	.97		.10		6.31
																6.32
		.15			.04			T.		.05				.04		5.72
	.49			.21				.28			.64	.48		.24		4.58
T.	.32	.24	T.	.05	.15			.19	T.	T.	.27	.55		.17		5.74
																5.79
0.07	0.30	0.01	0.02	0.17	0.03	0.01	0.12	0.08	0.01	0.50	0.19	0.03	0.03	0.15	0.04	4.48
	.57			.27	.09	.03	.26			.48	.24			.21	.02	4.80
.13	.17	T.	T.	.08	.09	.03	.08	.10	.05	.10	.09	T.	.08	.03	T.	3.83
.08	.23			.15	.02		.23			.14	.10	.12		.09	.02	3.04
.06	.24	.05	.08	.18			.13			1.30	.32		.05	.24	.13	6.25
0.09	0.10	0.02	T.	?	?	0.00	0.30	0.05	T.	0.02	0.48	0.36	0.00	0.19	0.00	6.53
		.08								.25	.15					3.58
.31				T.	T.			.10		.05	.56	.57				5.56
.03	.21			*	†2.10		1.30				.46	.36		.44		10.02
.03	.20	T.	T.	.03	.07			.10	T.	.03	.65	.35		.32		6.95
0.00	0.53	0.03	T.	0.01	0.04	0.00	0.04	T.	T.	0.11	0.64	0.28	0.02	0.11	T.	4.16
		.14			.17		.20			.17	.42			.26		2.66
	.74		T.	T.						.18	.79	.79	.09			5.28
	.65		.02	.03				T.	T.	.08	1.15			.07		4.72
	.64		T.	T.	.04			T.		.05	.22	.35		.10		4.01
	.60			.02	.01			T.		*	*	†1.13		.13	T.	4.01
0.04	0.35	0.05	0.11	0.07	0.02	T.	0.11	0.22	0.01	0.29	0.54	0.13	T.	0.09	0.37	4.98
T.	.61		T.	.05	T.	T.	.10			.15	1.18			.10		4.60
.06	.78	T.					.10	.14	T.	.20	1.08	.05		.06	T.	5.21
.12	.53		.08	.06				.12		.22	.40				.05	3.73
	.19	.03	.04	.23	.04		.05	.12		.15	.24			.08		3.54
T.	.18	.06	.03	.11	T.		.06	.19	T.	.13	.25	.09	T.	.08	.02	3.71
T.								.74		.32	.29				.16	3.86
.02	.38	.02	T.	.08			.07	.06	T.	.37	.51	.13		T.		4.40
.35							.32			.32		.30				3.69
.06	.80			.18			.09	.06		.23	.80	.03		.02		5.19
.06	.43	.06	.36	.18			.14	.06		.76				.19		5.05
T.	.34			.08	.04				.08	*	†.63	.27				4.74
.04	.30	T.		.03			.08	.12		.18	.53	.21	.01	.01	T.	5.02
	.64		.60	.02	T.		.60	.30		.72	.60	.20		T.	1.80	7.87
T.	.55	T.	.20	.06	.01		.01	.47	.04	.28	.76	.25	T.	.22	1.40	6.56
T.	.02	.17	.35	.05	.02			1.00		*	†.68	.08		.50	2.75	8.17
	.04	.54	.50	.05	.17		.02	.25	T.		.85	.52		.05	.65	6.26
.05	.15		T.	.10			.30			.45	.35	T.			.20	3.46
.02	.24	.02	.03	.08	.02		.02	.50		.38	.57	.23		.29	T.	4.95
.06	.51		T.				.10	.02		.13	.77	.05		.01	.02	4.63

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.76	0.68	0.10	0.00	0.01	0.07	0.01	0.09	0.43	0.02	0.07	0.03	0.03	0.00
Auburn.....	.82	.38	..	..	..	.15	..	.11	.57	..	.09	.05	.23	..
Fleming.....	*	†1.21	..	..	..	..	..	T.	.55	..	T.	T.	T.	..
Sherwood.....	.96	.47	..	..	.07	.05	..	.2	..	.03	.07	.05	.02	..
Skaneateles.....	.75	.88	.18	..	..	.05	.10	.13	.64	.07	.15	.15	.45	..
Watkins.....	.71	.64	.16	..	..	.23	..	*	†.27	..	.09	T.	T.	..
Romulus.....	.86	.63	.04	..	..	T.	..	.12	.44	.10	.11	T.	T.	..
Ithaca.....	.63	1.4 ⁸	.29	..	..	T.	..	.04	.34	..	.05	T.	T.	..
Penn Yan.....	.61	.31	..	..	..	.05	..	.04	.59	..	.03	T.	T.	..
Average	0.66	0.94	0.09	T.	0.02	0.09	0.02	0.11	0.52	0.05	0.24	0.22	0.03	0.01

*Record for the month incomplete. ||Received too late to be included in the averages.
 polated from values at other stations.

TATION FOR NOVEMBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.02	0.39	0.04	0.01	0.07	0.00	0.00	0.12	0.19	T.	0.19	0.20	0.12	0.00	0.06	T.	3.71
.....	.44	.05	.....	.12	.....	.....	.....	.35	.....	.25	.50	.28	.....	.10	.....	4.49
.....	T.	T.	T.	T.	.....	.....	.71	.....	.....	.21	.....	.....	.....	.....	.....	2.68
.....	.51	.04	.....	.03	.....	.....	.....	.19	.02	.27	.....	.04	.....	.08	.....	3.10
.03	.45	.20	.07	.10	.....	.....	.11	.20	.....	.30	.32	.22	.....	.15	.....	5.70
.04	.28	T.	.....	T.	.....	.....	T.	.09	.....	.04	.12	.10	.....	.04	T.	2.81
T.	.58	T.	.....	.05	.....	.....	.04	.31	.....	.31	.47	T.	.....	T.	T.	4.06
.05	.56	T.	.....	T.	.....	.....	.04	.10	.....	.10	.14	.13	.....	.07	.....	4.23
.....	.29	.....	.....	.25	.....	.....	.03	.25	.....	.02	.02	.18	.....	.03	.....	2.61
0.07	0.31	0.05	0.02	0.07	0.03	0.01	0.10	0.13	T.	0.15	0.50	0.22	0.01	0.13	0.05	4.96

*Amount included in next measurement.

† Not included in computing averages.

§ Inter-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE — (DEGREES FAHR.)									
		Normal for the month of November.	Length of record, years.	Record begins.	Record ends.	Mean for Nov., 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR NOVEMBER.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		36.4	..	.....	.....	38.5	+2.4	.....	.....	.....	.....
Angelica.....	Allegany.....	33.2	15	1854	1897	38.7	+5.5	41.6	1896	30.6	1871
Humphrey.....	Cattaraugus.....	36.6	15	1883	1897	37.1	+0.5	41.6	1896	30.2	1886
Elmira.....	Chemung.....	39.4	18	1850	1897	40.6	+1.2	45.2	1896	33.9	1858
<i>Eastern Plateau.</i>		36.4	..	.....	.....	37.2	+0.8	.....	.....	.....	.....
Oxford.....	Chenango.....	35.9	29	1828	1897	39.0	+3.1	42.7	1847	30.6	1842
Cortland.....	Cortland.....	36.1	35	1829	1897	38.2	+2.1	45.0	1849	31.1	1851
Cooperstown.....	Otsego.....	35.0	44	1854	1897	35.2	+0.2	41.1	1896	26.8	1873
Waverly.....	Tioga.....	38.4	16	1882	1897	39.4	+1.0	44.4	1896	35.0	1882
<i>Northern Plateau.</i>		35.2	..	.....	.....	34.1	-1.1	.....	.....	.....	.....
Lowville.....	Lewis.....	35.2	32	1827	1897	34.1	-1.1	42.6	1830	29.1	1893
<i>Atlantic Coast.</i>		44.1	..	.....	.....	41.6	+0.5	.....	.....	.....	.....
New York City.....	New York.....	43.5	28	1870	1897	44.0	+0.5	48.6	1870	37.5	1873
Setauket.....	Suffolk.....	44.5	13	1885	1897	45.3	+0.8	48.4	1896	40.5	1894
<i>Hudson Valley.</i>		38.9	..	.....	.....	38.5	-0.4	.....	.....	.....	.....
Albany.....	Albany.....	39.3	24	1874	1897	39.0	-0.3	44.0	1896	32.0	1875
Honeymead Brook.....	Dutchess.....	38.5	17	1881	1897	37.9	-0.6	41.8	1887-96	34.7	1894
<i>Champlain Valley.</i>		34.8	..	.....	.....	33.0	-1.8	.....	.....	.....	.....
Plattsburgh Barracks.	Clinton.....	34.8	43	1839	1897	33.0	-1.8	43.5	1849	28.9	1875
<i>St. Lawrence Valley.</i>		35.0	..	.....	.....	35.0	-0.3	.....	.....	.....	.....
Madison Barracks.....	Jefferson.....	36.8	37	1839	1897	36.3	-0.5	46.1	1849	27.6	1873
Canton.....	St. Lawrence.	34.4	35	1862	1897	32.6	-1.8	38.8	1863	25.6	1873
North Hammond.....	"	34.8	20	1866	1897	36.2	+1.4	41.1	1896	25.5	1873
Potsdam.....	"	33.8	29	1828	1896	.....	.....	40.4	1830	30.4	1842
<i>Great Lakes.</i>		38.5	..	.....	.....	39.5	+1.0	.....	.....	.....	.....
Buffalo.....	Erie.....	38.4	27	1871	1897	40.0	+1.6	43.7	1882	30.3	1873
Rochester.....	Monroe.....	39.2	28	1870	1897	39.0	-0.2	42.0	1896	26.6	1873
Fort Niagara.....	Niagara.....	39.5	42	1842	1897	41.5	+2.0	47.5	1849	31.5	1873
Baldwinsville.....	Onondaga.....	38.0	19	1854	1897	38.4	+0.4	42.6	1896	36.2	1857
Oswego.....	Oswego.....	38.6	28	1870	1897	39.0	+0.4	43.0	177-96	32.0	1873
Palermo.....	"	34.8	44	1854	1897	26.7	+1.9	41.9	1859	26.8	1873
Erie, Pennsylvania ...	Erie.....	40.9	24	1874	1897	42.0	+1.1	44.0	1896	34.4	1880
<i>Central Lakes.</i>		38.6	..	.....	.....	39.4	+0.8	.....	.....	.....	.....
Ithaca.....	Tompkins.....	38.6	19	1879	1897	39.4	+0.8	44.7	1896	33.1	1880
Average departure..		.....	.....	.....	.....	.....	+0.6	.....	.....	.....	.....

AND PRECIPITATION — NOVEMBER.

STATION.	COUNTY.	PRECIPITATION — (INCHES.)									
		Average for the month of November.	Length of record, years.	Record begins.	Record ends.	Total for Nov., 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR NOVEMBER.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau.</i>		2.71	12	.....	.....	3.60	+0.89	.....	.....	.....	.....
Angelica.....	Allegany.....	2.59	15	1871	1897	3.07	+0.48	4.27	1879	1.64	1871
Humphrey.....	Cattaraugus.....	3.51	15	1883	1897	4.83	+1.32	6.23	1886	1.64	1894
Elmira.....	Chemung.....	2.02	17	1851	1897	2.89	+0.87	4.19	1880	0.31	1861
<i>Eastern Plateau.</i>		2.97	12	.....	.....	4.60	+1.63	.....	.....	.....	.....
Oxford.....	Chenango.....	2.84	27	1839	1897	4.85	+2.01	4.95	1852	0.91	1831
Cortland.....	Cortland.....	3.23	20	1850	1897	3.55	+0.32	5.60	1851	1.94	1893
Cooperstown.....	Otsego.....	3.12	44	1854	1897	5.21	+2.09	5.38	1858	1.45	1876
Port Jervis.....	Orange.....	3.22	13	1880	1897	5.71	+2.49	5.71	1897	1.12	1883
Waverly.....	Tioga.....	2.43	16	1882	1897	3.69	+1.26	5.90	1880	0.91	1883
<i>Northern Plateau.</i>		3.37	12	.....	.....	5.81	+2.44	.....	.....	.....	.....
Lowville.....	Lewis.....	3.37	34	1827	1897	5.81	+2.44	5.81	1897	1.40	1827
<i>Atlantic Coast.</i>		4.27	12	.....	.....	5.10	+0.83	.....	.....	.....	.....
New York City.....	New York.....	3.77	28	1870	1897	4.44	+0.67	9.82	1889	0.82	1890
Setauket.....	Suffolk.....	4.77	13	1885	1897	5.76	+0.99	8.22	1892	0.74	1890
<i>Hudson Valley.</i>		3.53	12	.....	.....	5.37	+1.84	.....	.....	.....	.....
Albany.....	Albany.....	2.98	24	1874	1897	4.65	+1.67	5.40	1886	0.91	1893
Honeymead Brook.....	Dutchess.....	3.16	17	1881	1897	5.07	+1.91	5.07	1897	0.89	1890
Poughkeepsie.....	".....	3.21	22	1830	1897	5.45	+2.24	7.00	1830	0.80	1890
West Point.....	Orange.....	4.07	49	1840	1897	5.40	+1.33	10.02	1846	1.05	1844
Boyd's Corners.....	Putnam.....	4.24	27	1870	1897	6.31	+2.07	8.45	1889	1.12	1890
<i>Champlain Valley.</i>		2.41	12	.....	.....	3.58	+1.17	.....	.....	.....	.....
Plattsburgh Barracks.....	Clinton.....	2.41	38	1840	1897	3.58	+1.17	4.39	1885	0.54	1882
<i>St. Lawrence Valley.</i>		2.81	12	.....	.....	3.34	+0.53	.....	.....	.....	.....
Madison Barracks.....	Jefferson.....	2.94	36	1840	1897	2.66	-0.28	10.02	1889	1.27	1870
North Hammond.....	St. Lawrence.....	3.30	19	1866	1897	4.01	+0.71	6.78	1866	1.73	1874
Potsdam.....	".....	2.18	28	1828	1896	.....	.....	4.10	1889	0.17	1836
<i>Great Lakes.</i>		3.37	12	.....	.....	5.33	+1.96	.....	.....	.....	.....
Buffalo.....	Erie.....	3.59	28	1870	1897	5.21	+1.62	6.05	1886	1.82	1894
Rochester.....	Monroe.....	2.87	28	1870	1897	3.71	+0.84	5.46	1877	0.80	1887
Fort Niagara.....	Niagara.....	2.42	42	1841	1897	3.69	+1.27	4.82	1842	0.54	1887
Oswego.....	Oswego.....	3.51	27	1871	1897	6.56	+3.05	6.56	1897	1.78	1883
Palermo.....	".....	3.74	38	1860	1897	8.17	+4.43	8.17	1897	1.01	1882
Erie, Pennsylvania.....	Erie.....	4.10	25	1873	1897	4.63	+0.53	8.35	1897	1.90	1894
<i>Central Lakes.</i>		2.55	12	.....	.....	4.22	+1.67	.....	.....	.....	.....
Ithaca.....	Tompkins.....	2.55	19	1879	1897	4.22	+1.67	6.03	1886	1.25	1880
Average departure.....		.....	.....	.....	.....	.....	+1.51	.....	.....	.....	.....

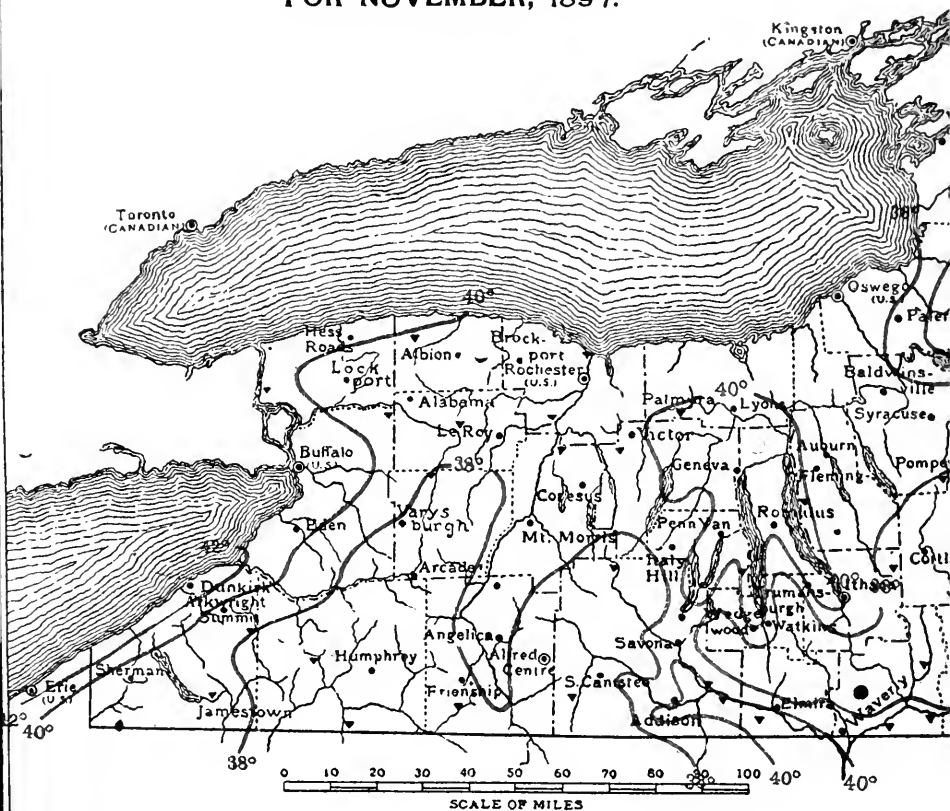


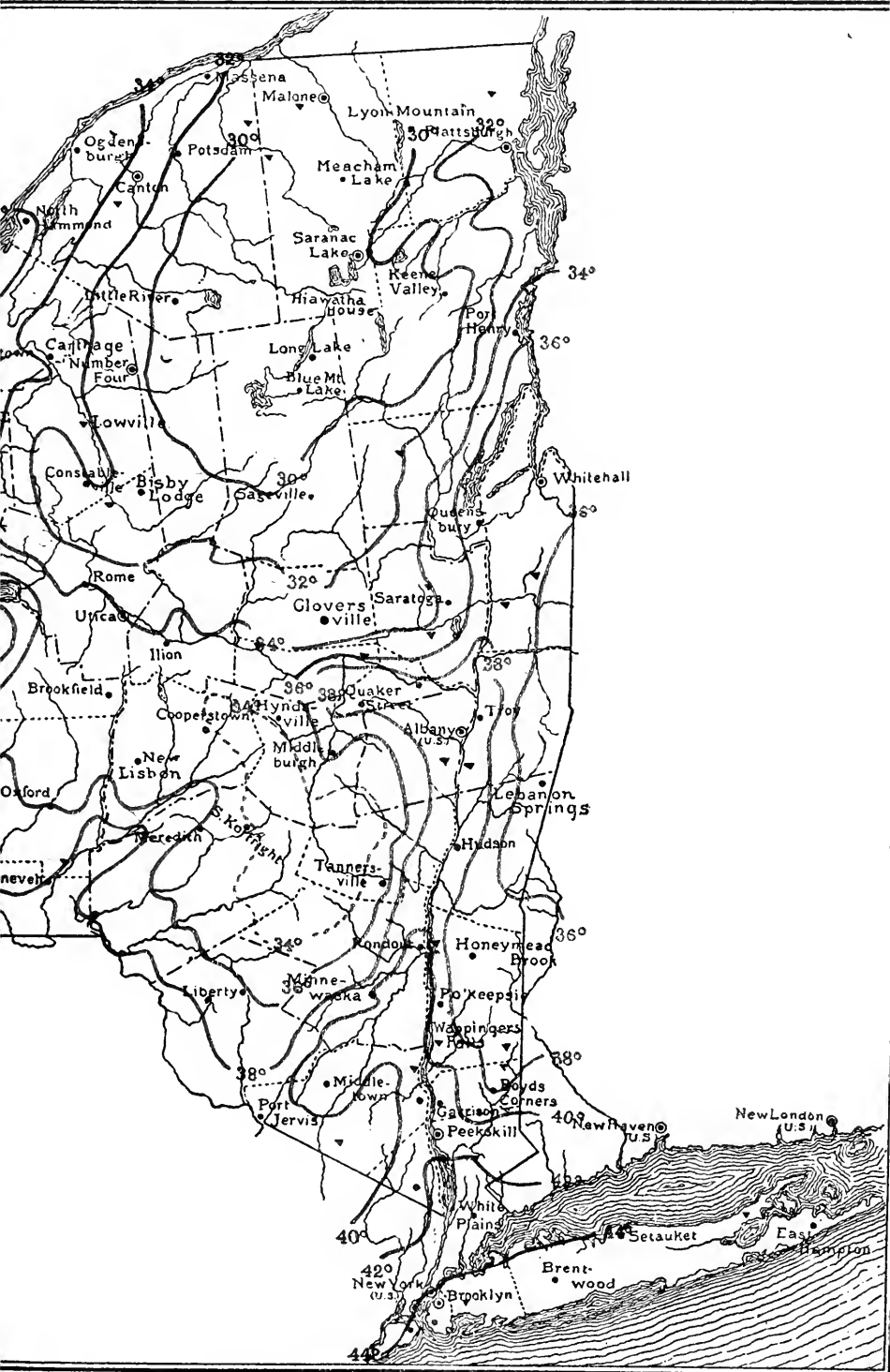
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR NOVEMBER, 1897.



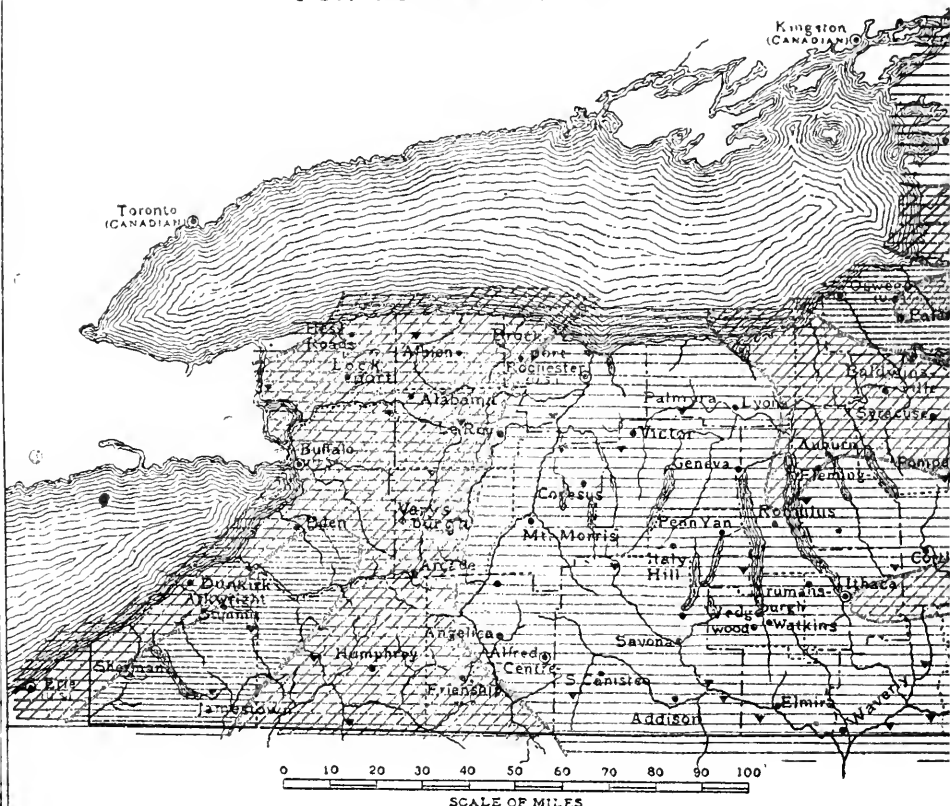


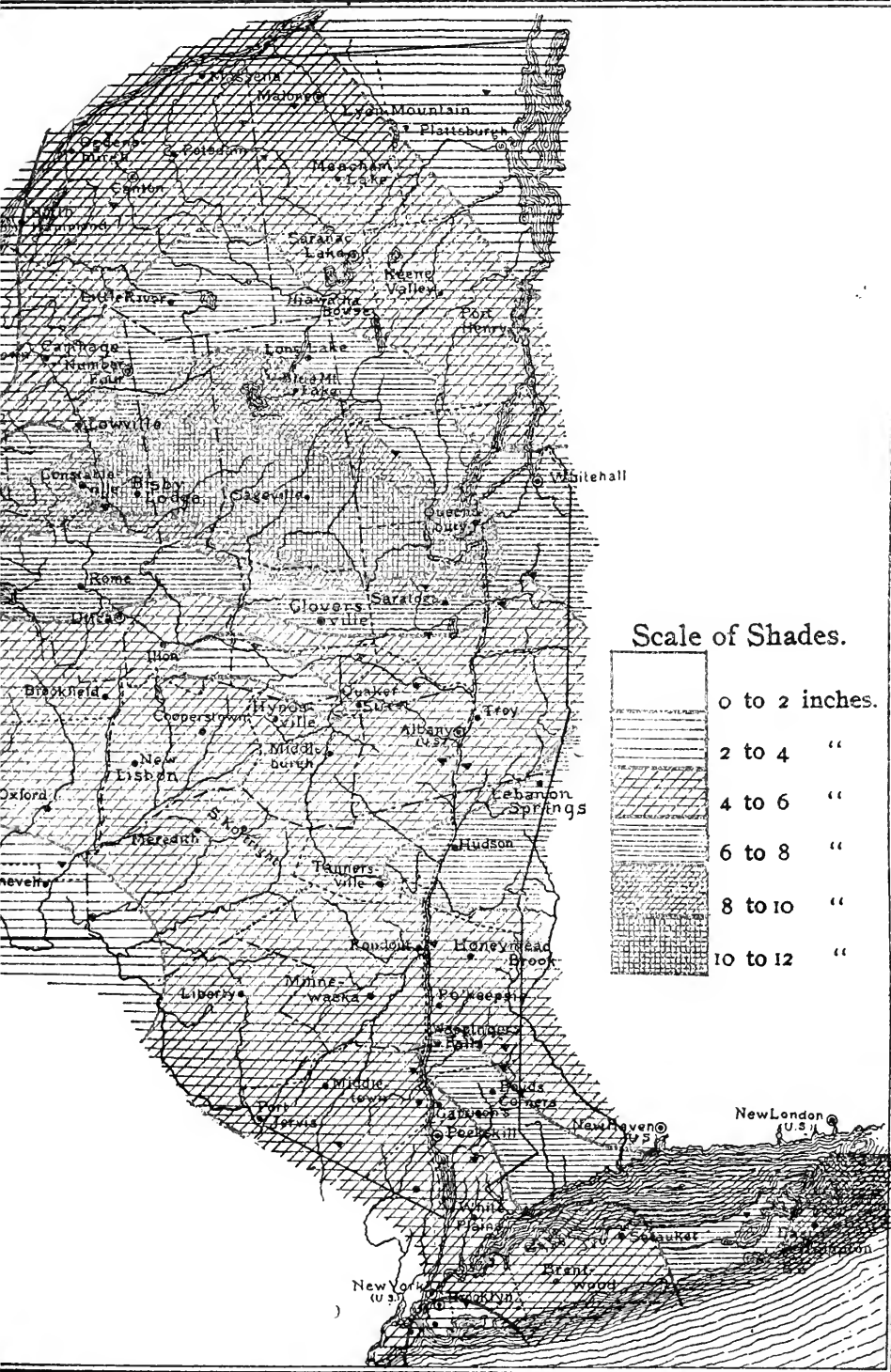
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR NOVEMBER, 1897.





Meteorological Summary for December, 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State was 30.06 inches. The highest barometer was 30.62 inches at Albany on the 3d, and the lowest, 29.27 inches at New York city on the 31st. The mean pressure was highest near the eastern and southern borders. The mean pressure at 6 stations of the National Bureau was 0.01 inches below normal, deficiencies obtaining at all stations excepting Albany.

The mean temperature of the State was 28.2 degrees, as derived from observations of maxima and minima at 84 stations. The highest local mean was 36.7 degrees at Setauket, L. I.; the lowest being 19.8 degrees at Saranac Lake. The highest general daily mean was 49 degrees on the 11th, and the lowest, 9 degrees on the 24th. The maximum temperature recorded was 65 degrees at Lyons on the 9th, the minimum being 21 degrees below zero at Canton on the 25th. The mean monthly range of temperature for the State was 61 degrees, the greatest local value being 79 degrees at Canton, and the least, 48 degrees at Setauket. The mean daily range was 15 degrees. The greatest local daily range was 50 degrees at Canton on the 25th, and at Poughkeepsie on the 28th, the least being 1 degree at Lake Placid on the 6th. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 29.7 degrees; the Eastern Plateau, 28.6 degrees; the Northern Plateau, 22.4 degrees; the Atlantic Coast, 34.9 degrees; the Hudson Valley, 30.3 degrees; the Mohawk Valley, 26.5 degrees; the Champlain Valley, 25.2 degrees; the St. Lawrence Valley, 24.2 degrees; the Great Lake

Region, 29.9 degrees; the Central Lake Region, 30.3 degrees. The mean temperature of the State, as derived from observations at 24 stations possessing records for ten years or more, was 1.0 degree above the normal. The only deficiencies were reported from 5 stations of the St. Lawrence Valley and the Great Lake Region.

The mean relative humidity was 80 per cent. The mean dew-point was 24 degrees.

The average precipitation for the State was 3.90 inches of rain and melted snow, as derived from the records of 102 stations. The heaviest precipitation, exceeding six inches, occurred over the southern Adirondack Plateau and a portion of the Coast Region, while the least amount under, 2 inches, occurred in the western-central section. The maximum local precipitation was 6.71 inches at Port Jervis, while the minimum was 1.56 inches at Penn Yan. A list of the greatest rainfall rates will be found in the table of meteorological data. The average total snowfall at 69 well distributed stations was 13.6 inches. In central New York generally the amounts ranged from 10 to 15 inches, although in the southwestern highlands, and near the upper Mohawk Valley, 20 inches or more fell. The snowfall on the Northern Plateau averaged over 25 inches, and on the Coast about 5 inches. The maximum local amount was 32.6 inches at Madison Barracks. Reports from 48 stations show that on the 15th the ground was generally free from snow, while at the close of the month (owing mainly to the storm of the 30th) there was a snow covering 1 to 18 inches deep, in all sections excepting the Coast. The average precipitation for the State was 0.94 inches above the normal, only 4 scattered stations reporting deficiencies. The amount was the greatest recorded for December at Honeymead Brook.

The average number of days on which the precipitation amounted to 0.01 inches or more was 13.6; the number being greatest near the Great Lakes and the Northern Plateau, and least in the southeast. The average number of clear days was 4.4; of partly cloudy days, 7.5, and of cloudy days, 19.1, giving an average cloudiness of 70 per cent. for the State. The cloudiness, like the rain frequency, was at a maximum in western and northern New York, the minimum occurring in the southeast.

The prevailing winds were from the southwest. The average total wind travel at 6 stations of the National Bureau was 9,039 miles, which is in excess of the usual mileage for the month. The maximum velocity recorded at the above stations was 60 miles per hour at Buffalo on the 5th.

No thunderstorms were reported during the month.

Auroras were reported from 1 station on the 19th and from 2 stations on the 21st.

Hail fell on the 13th, 17th and 20th, and sleet on the 4th, 6th, 7th, 14th, 17th, 20th, 26th and 30th.

Lunar halos were observed on the 2d, 5th, 6th, 8th, 10th, 13th.

GENERAL FEATURES OF THE WEATHER.

The temperature for December averaged considerably higher than usual in southern New York, but nearly normal in the northern section. About normal conditions obtained during the first week, the succeeding ten days being unseasonably warm. Cold weather followed, until the 30th, the general minima occurring on the 19th, 24th and 28th, when temperatures fell below zero in the northern and highland sections. The precipitation was well distributed through the month, a considerable excess over the usual values obtaining in the State at large. About the usual snowfall occurred, but was quickly melted by the warm

waves preceding the 19th, so that, even in northern New York, the ground was covered only during the last decade. The heaviest general snowfall occurred on the 30th and 31st. The number of wet days was greater than usual for December, while less sunshine obtained over the State than for any month since November, 1892.

The period from the 8th to 13th was like the Indian Summer in southern New York and plowing was carried on to a considerable extent. Lakes and the larger streams were open in mid-channel the entire month as far north as Lake George. Gales and driving snowstorms occurred about the 22d, 23d and on the 29th to 31st, in some sections, but little interruption to traffic resulted. A severe gale occurred along the coast on the 14th.

The weather in this vicinity was influenced by seven areas of high and eleven areas of low pressure during December. The fluctuations of pressure, and the resulting weather conditions of the month, seem in an unusual degree to be the result of atmospheric movements on the largest scale, the pressure varying rapidly over the entire continent, while local highs and lows developed or dissipated as suddenly. The paths of the storms in most cases were near or over this State; 4 of them approaching from the southwest, 6 from the west, and 1 remaining on the southern coast. The depressions which passed over or near this State on the 5th, 15th, 23d, 30th and 31st, were strongly developed cyclones, the remainder being of moderate intensity. The anti-cyclones were of large extent and considerable intensity. Passing, as a rule, well to the northward, and thence spreading along the coast, they gave marked depressions of temperature in this section, alternating sharply with the warm waves due to the lows.

The following is a brief account of the pressure movements of the month:

Low I, 29.9 inches, passed from the Upper Lakes along our northern border on the 1st, bringing nearly normal temperature, and moderate snows, except near the coast.

High I, 30.6 inches, covered the continent on the 2d, and increased over Canada on the 3d. Fair, cool weather on the 2d was followed by rising temperature on 3 days following due to

Low II, 29.3 inches approaching from the southeast, and passing to the northward of the State on the 5th, bringing snow and rains, heaviest in the east, with gales on the Lakes.

High II, 30.3 inches, developing over Canada gave generally fair and colder weather on the 6th; thence spreading down the coast, strengthening the warm wave due to

Low III, 29.8 inches, a very depression over Canada on the 7th and 8th. Scattered showers occurred on the 7th, and the three days following were cloudy and mild.

Low IV, 29.7 inches, passed over New York in a southeasterly direction on the 11th, giving temperatures 20 to 30 degrees above the normal, while moderate general rains occurred on the 11th and 12th.

High III, 30.2 inches, originating north of the lakes, spread toward the southern coast on the 13th, lowering the temperature nearly to the normal in this section. Cloudy weather on the 13th was followed by two days of heavy rain, due to

Low V, 29.5 inches, originating in the southwest, passing to the lakes, and thence eastward over New York. This storm gave a decided rise of temperature, especially in the Coast Region, and high winds over the State.

High IV, 30.4 inches, moved from the west to the southern coast on the 15th, thence spreading northward and giving cooler and partly cloudy weather on the 16th to 17th. Moderate scattering rain followed by sleet and snow occurred over western New York in the line of the depression between IV and

High V, 30.7 inches, a large anticyclone moving slowly along the northern border from the 14th to 19th, bringing a sharp cold wave as the area reached this State on the 19th and 20th.

Low VI, 29.7 inches, developing in the Mississippi Valley, passed over southern New York on the 21st, bringing a moderate snowfall, which continued on the 22d and 23d when

Low VII, 29.5 inches, passed over the Lakes and northeastward, giving a sharp rise of temperature in northern New York. A blizzard and cold wave followed on the 23d to 24th with the approach of

High VI, 30.5 inches, a very large area, which passed over the Central States and Lakes toward the coast. The weather was generally fair from the 24th to 26th.

Low VIII, 29.7 inches, passed far to the northward over Canada on the 26th, raising the temperature slightly above the normal, while only light scattering snow or rain fell in New York, due in part to

Low IX, 29.7 inches, which developed and remained over the Southern States and coast.

High VII, 30.5 inches, passing eastward near the Canadian border, reached this vicinity on the 28th, bringing a sharp fall of temperature and fair weather.

Low X, 29.5 inches, followed in the rear of VII, reaching the St. Lawrence Valley on the 30th.

Low XI, 29.0 inches, developed suddenly in the Ohio Valley, passing centrally over New York on the 30th to 31st, and, with X, gave heavy rain or wet snow and a warm wave.

NOTES OF OBSERVERS AT THE FOLLOWING STATIONS: Humphrey, 23d, high westerly gale, snow drifting badly; winter wheat protected by snow in extreme cold of 24th and 25th. Jamestown, blizzard on 23d and 31st. Bouckville, considerable plowing this month. New Lisbon, creeks full on the 5th and 15th. Perry City, wheat looked well when snow came; stock in good condition; some plowing under way. Setauket, gale on 14th. Bedford, from 8th to 13th a period like Indian Summer. Cedar Hill, high water in Hudson river on 15th and 16th. Honeymead Brook, easterly gale on 14th. Lake George, lake open all the month excepting along shore. Penn Yan, winter grain very poor.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.					HUMIDITY.		TEMPERA.				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri daily obser- vations.	Mean of maximum and minimum.	Hig- hest.	Date.
<i>Western Plateau.</i>														
Alfred	Alleghany	1795										29.7	62	10
Angelica	"	1340										29.6	59	10
Bolivar	"	1800										29.7	61	10
Franklinville	Cattaraugus	1598										28.1	59	a
Humphrey	"	1950									28.6	28.6	62	10
Arkwright	Chautauqua	1260										28.8	55	10
Jamestown	"	1324										30.2	58	10
Elmira	Chemung	863										32.2	60	10
Avon	Livingston	585										30.6	62	10
Mt. Morris	"	525												
Nunda	"													
Lockport	Niagara	659									33.8	33.2	60	10
Victor	Ontario											29.0	60	10
Wedgewood	Schuyler	1350									27.3	28.1	60	a
Addison	Stenben	1000									31.3	31.1	61	10
South Canisteo	"	1480							78	29	29.2	29.1	61	10
Arcade	Wyoming	1707										27.5	57	7
<i>Eastern Plateau</i>														
Binghamton (1)	Broome	870									30.2	30.1	61	10
Binghamton (2)	"	875										30.0	61	10
Oxford	Chenango											27.4	57	a
Cortland	Cortland	1120										28.6	58	a
South Kortright	Delaware	1700										27.4	59	10
Bouckville	Madison	1350										25.6	55	a
Middletown	Orange	700									30.2	29.8	59	11
Port Jervis	Orange	470										29.9	59	11
Cooperstown	Otsego	1250									27.8	27.8	58	10
Garrattsville	"										27.0	26.6	60	10
New Lisbon	"	1231									26.6	26.2	59	10
Oneonta	Otsego	1100									30.3	30.6	62	10
Perry City	Schuyler	1038									28.7	27.6	60	10
Straits Corners	Tioga											28.3	60	10
Waverly	Tioga	824									30.7	31.0	63	11
Dryden	Tompkins	1079										29.3	64	10
Mohonk Lake	Ulster	1245									28.4	28.6	54	11
<i>Northern Plateau.</i>														
Elizabethtown	Essex											22.4	56	a
Lake Placid	"											22.2	56	11
Saranac Lake	Franklin											23.1	53	10
Gloversville	Fulton	850									24.7	19.8	56	10
Little Falls (2a)	Herkimer	1526										23.6	55	11
North Lake	"											20.2	52	10
Lowville	Lewis	900										23.7	55	10
Number Four	"	1571	30.06	30.57	8	29.57	15	1.00				21.8	51	11

FOR DECEMBER, 1897.

TEMPERATURE — (IN DEGREES FAHR.).										SKY.			PRECIPITATION — (INCHES).					Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	+ Duration.	Date.	Total snowfall.		
-4	24	59	14	38	25	12	1	2	2	5.5	23.3	14.7	2.76	0.95	h m. 7.30	15
-2	24	61	13	31	2	12	15	0	9	22	15	3.10	0.56	.....	15	14.0	S. W.
-2	29	63	17	37	29	21	30	1	8	27	14	3.02	0.59	.....	15	11.0	W.
-1	24	60	14	32	2	3	30	2	3	26	23	4.01	0.95	7.30	15	19.0	S. W.	
0	24	62	13	28	25	2	6	0	4	27	21	3.59	0.81	.....	15	21.6	S. W.
3	24	52	10	22	25	3	30	0	7	24	17	4.32	0.70	.....	14	22.5	S. W.
5	24	53	11	25	25	3	6	0	7	24	17	4.32	0.70	.....	14	22.5	S. W.
4	e	56	14	37	25	4	16	9	2	20	7	1.60	0.63	.....	15	....	N. W.-S. E.
1	24	61	14	32	1	3	16	0	2	28	10	1.65	0.86	.....	15	....	S. W.
.....	
2	24	58	14	31	25	6	16	6	5	20	.....	.....	.....	.....	.....	.....	W.
-2	24	62	15	32	25	4	15	2	7	22	11	1.93	0.60	.....	31	10.0	S. W.
2	25	59	13	33	25	3	6	4	12	15	13	1.91	0.67	22.00	14-15	9.8	S. W.	
-1	24	62	15	38	25	3	6	3	4	24	14	2.71	0.80	.....	14	14.2	N. W.
-4	24	61	14	38	25	5	16	0	6	25	23	3.47	0.49	.....	15	15.2	.....
-10	29	60	14	39	25	2	16	4.5	8.8	17.7	13.3	3.99	1.46	.....	14	.....	.....
2	25	59	13	37	25	5	21	1	17	13	15	4.03	0.80	.....	31	14.7	S. E.
0	29	61	12	34	29	3	15	4	7	20	18	3.23	1.20	.....	31	.....	W.
-2	25	59	18	32	25	8	15	1	12	18	19	4.01	0.86	.....	5	18.3	N. W.-S.
-1	25	59	14	28	9	6	7	3	3	25	9	3.00	0.98	.....	7	....	S.
-4	29	63	18	28	29	9	16	.....	.....	.....	9	4.02	.....	.....	.....	.....	.....
-6	28	61	14	23	2	6	7	4	4	23	13	3.43	0.75	.....	5	19.0	S.
5	24	54	13	23	11	6	16	8	12	11	12	5.71	.....	.....	.....	16.0	.....
3	29	56	12	25	29	2	17	9	13	9	13	6.71	1.46	.....	14	10.0	N. W.
-5	29	63	12	30	29	3	21	10	9	12	15	4.64	1.22	.....	4	21.5	S.
-10	31	70	17	47	30	8	7	8	7	16	6	2.45	.....	.....	.....	21.2	W.
-10	29	69	15	33	29	7	16	3	7	21	13	4.20	1.40	.....	31	21.0	S.
-1	29	63	16	31	29	3	18	.....	.....	.....	10	5.30	1.20	.....	4	.....	.....
0	24	60	14	28	25	5	6	1	6	24	17	2.86	1.13	.....	14-15	11.7	S. W.
-2	25	58	15	36	27	2	7	.....	.....	.....	11	2.12	0.96	17.00	14-15	9.2	S.
-5	25	68	16	39	25	4	15	2	10	19	19	2.70	0.60	.....	31	11.8	N. W.
2	24	62	13	27	25	4	15	11	10	10	.....	.....	.....	.....	.....	.....	S. W.
4	24	50	12	21	18	4	16	1	4	26	6	3.94	2.32	.....	15	15.0	S. W.
-19	24	65	17	41	25	1	6	5.0	5.0	21.0	15.3	4.35	1.83	13.00	4-5	.....	.....
-10	24	65	20	38	18	2	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
-11	28	64	17	35	20	1	6	8	1	22	7	1.90	0.60	.....	14	8.5	S.
-19	24	75	22	41	25	6	7	7	2	22	12	2.22	0.58	.....	5	15.0	W.-S. W.
-4	29	58	14	24	4	5	16	5	5	21	18	6.52	1.47	.....	14	22.8	N. E.
-4	24	59	16	29	27	5	16	5	2	24	16	6.46	1.83	13.00	4-5	25.8	E. W.	
-16	28	68	16	29	29	5	14	3	9	19	12	5.74	1.40	.....	4	27.0	W.
-12	28	67	17	38	2	6	16	3	13	15	18	3.02	0.84	.....	15	17.0	W.
-13	25	64	16	37	25	5	16	4	3	24	18	4.60	0.87	19.40	14-15	30.7	S.	

METEOROLOGICAL DATA

LOCATION OF STATIONS.		BAROMETER.					HUMIDITY.			TEMPERA				
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees)	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Atlantic Coast.....												34.9	64	11
Brooklyn.....	Kings.....											35.6	63	11
Manhattan Beach.....														
New York City.....	New York.....	314	30.09	30.55	2	29.27	31	1.28	77			36.0	60	11
Willeys Point.....	Queens.....											35.3	64	11
Brentwood.....	Suffolk.....	80										35.2	61	9
Setauket.....	".....	40							74	28	36.1	36.7	60	c
Bedford.....	Westchester.....	290										33.4	62	11
Primrose.....	".....	209										32.2	62	11
Hudson Valley.....												30.3	62	11
Albany.....	Albany.....	97	30.00	30.62	3	29.19	31	1.22	82	25		29.0	58	11
Cedar Hill.....													59	11
Hoevmead Brook.....	Dutchess.....	450								29.7		29.5	57	a
Poughkeepsie.....	".....	180										33.4	62	11
Wappinger's Falls.....	Dutchess.....	110										31.3	61	12
Catskill.....	Greene.....	450										31.2	58	11
West Point.....	Orange.....	167										31.0	58	12
Cornel.....	Washington.....	590										30.8	55	10
Greenwich.....	Putnam.....											26.3	57	11
Mohawk Valley.....												26.5	64	11
Little Falls (12).....	Herkimer.....	324										23.4	60	11
Canajoharie.....	Montgomery.....	360								29.3		29.4	59	11
St. Johnsville.....	".....	354										29.2	64	11
Rome.....	Oneida.....	415										24.0	56	11
Champlain Valley.....												25.2	57	b
Plattsburgh Barks.....	Clinton.....	125										23.6	55	12
Ticonderoga.....	Essex.....											27.4	57	b
Glen's Falls.....	Warren.....	340								25.4		23.9	55	11
Lake George.....	".....	340							85	22	36.5	25.9	54	11
St. Lawrence Valley.....												24.2	61	11
Alexandria Bay.....	Jefferson.....													
Madison Barracks.....	".....	266										25.4	6	11
Watertown.....	".....	486												
Canton.....	St. Lawrence.....	304								23.7		22.1	58	10
North Hammond.....	".....	360								25.2		27.6	60	10
Ogdensburg.....	".....	258										23.6	59	10
Potsdam.....	".....	300								22.2		21.7	58	10
Great Lakes.....												29.9	65	9
Westfield.....	Chautauqua.....	758										32.3	62	10
Buffalo.....	Erie.....	768	30.05	30.55	19	29.60	5	1.95	75	24		30.0	59	10
Pittsford.....	Monroe.....	592								30.7		30.3	62	10
Rochester.....	".....	523	30.04	30.51	2	29.58	5	1.93	79	24		30.0	62	10
Appleton.....	Niagara.....	301										30.2	60	10
Fort Niagara.....	".....	263										31.2	63	10
Baldwinsville.....	Onondaga.....	290									27.8	26.4		
Ridgeway.....	Orleans.....											29.9	63	10
Oswego.....	Oswego.....	225	30.04	30.56	3	29.54	5	1.02	83	24		29.0	59	10
Palermo.....	".....	460									26.7	26.3	54	11
Lyons.....	Wayne.....	40									31.7	31.4	65	9
Erie, Pa.....	Erie.....	714	30.07	30.54	19	29.66	29	0.88	85	27		32.0	61	10

FOR DECEMBER, 1897 — (Continued).

TEMPERATURE—(IN DEGREES FAHR.).							SEX.	PRECIPITATION—(INCHES).							Prevailing direction of wind.		
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	*Duration.		Date.	Total snowfall.
-11	29	55	14	37	29	22	18	8.5	10.0	12.3	11.3	5.26	1.34	24.00	14-15	.....	.....
11	24	52	10	19	k	22	18	8	9	14	16	4.74	1.96	14.00	14	3.2	E.
9	24	51	12	20	18	5	3	8	9	14	12	4.83	1.65	.....	14	2.9	N. W.
10	31	53	15	31	11	7	3	.....	.....	.....	10	5.66	2.90	.....	14	5.4	N.
5	29	56	18	37	29	5	3	13	7	11	8	5.50	2.00	.....	14-15	1.5	N. W.
12	21	48	12	32	18	5	21	7	11	13	12	6.60	4.34	24.00	14-15	2.5	N. W.
-1	29	63	16	31	29	6	bb	12	9	10	11	4.23	1.82	24.00	4-15	8.4	W.
1	29	61	15	29	m	5	3	4	15	12	10	5.42	2.12	.....	14	6.3	.....
-9	25	58	15	50	28	4	bc	7.2	6.8	17.0	11.1	5.19	2.61	.....	14-15	.....	.....
4	29	51	12	22	29	4	8	5	4	22	15	4.88	1.12	.....	15	.....	S.
1	29	58	.....	.....	.....	.....	.....	9	7	15	14	5.02	1.14	.....	15	12.0	S.
-1	29	56	13	27	29	5	bd	5	8	18	10	5.39	1.49	20.00	4-5	14.5	S. W.
-4	28	66	21	50	28	5	3	9	6	16	9	4.57	2.23	.....	14	5.5	N.
1	29	60	15	26	10	6	3	6	10	15	15	5.99	1.42	.....	14	15.0	N.
4	29	54	12	20	30	4	bb	1	12	14	8	5.98	2.61	.....	14-15	19.0	N.
3	29	55	16	31	23	6	10	.....	.....	.....	7	5.60	2.30	.....	15-16	.....	N. W.
1	29	54	12	21	29	4	21	14	1	16	12	5.22	1.78	22.00	14-15	17.8	.....
-9	25	66	16	28	h	4	13	6	5	30	10	4.59	1.36	.....	15	7.9	N.
-5	g	62	11	43	25	2	be	6.0	5.7	19.3	15.2	4.49	1.90	.....	14	.....	.....
-3	21	63	14	29	29	3	19	5	6	20	15	5.22	1.74	7.00	5	20.5	E.
1	29	58	12	24	24	4	15	10	2	19	13	4.60	1.29	.....	14	18.5	E.
-1	29	68	16	33	25	7	5	3	9	19	16	4.65	1.29	.....	5	13.5	W.
-5	g	61	15	40	19	3	cc	.....	.....	.....	17	3.49	0.97	.....	11	.....	.....
-7	25	60	15	31	31	3	cd	5.7	5.7	19.6	11.8	3.88	2.21	21.00	14-15	.....	.....
-1	25	59	15	31	30	3	cc	.....	.....	.....	9	1.96	0.98	.....	15	.....	W.
-5	25	62	16	26	25	3	13	6	6	19	11	4.10	1.34	.....	15	4.6	S.
-7	25	62	14	29	25	4	dd	6	2	23	14	4.71	1.10	.....	14	17.5	N.
-5	25	59	15	28	n	4	12	5	9	17	13	4.75	2.21	24.00	14-15	12.8	S. W.
-21	25	73	18	50	25	3	13	2.0	14.0	15.0	12.8	3.04	1.69	.....	22-23	.....	.....
-11	h	72	18	35	p	5	13	.....	.....	.....	15	3.68	1.60	.....	22-23	32.6	W.
-21	25	79	20	50	25	3	12	3	8	20	12	3.21	1.65	.....	14-15	13.0	S. W.
-10	21	70	14	26	25	4	31	0	20	11	13	2.51	1.05	.....	15	11.8	W.
-12	25	71	18	46	25	5	15	3	14	14	11	2.77	.....	.....	.....	5.8	S. W.
-13	24	71	15	49	25	2	14	9	7	15	7	3.26	1.63	.....	14-15	.....	S. W.
-6	28	58	12	31	25	3	de	1.1	7.6	22.3	18.1	3.17	1.31	.....	14	.....	.....
6	2	56	13	30	29	4	19	4	3	24	16	2.71	0.59	.....	15	7.5	N. W.
1	24	58	11	28	25	5	10	0	7	24	19	3.59	1.31	.....	11	.....	W.
2	21	61	12	28	4	3	5	1	6	24	18	2.26	0.68	.....	14	.....	W.
3	24	59	12	31	25	3	12	1	5	25	24	3.39	0.61	.....	14	18.4	S. W.
5	e	55	12	30	25	4	26	0	3	28	15	3.34	1.16	.....	11	14.6	S. W.
4	24	59	14	30	25	6	30	.....	.....	.....	7	2.77	.....	.....	.....	5.0	N.
4	28	.....	14	30	14	6	15	.....	.....	.....	15	3.64	0.93	.....	14	12.0	.....
4	24	59	13	30	23	5	12	2	21	8	18	2.80	1.12	.....	14	15.5	S. W.
4	28	55	12	25	25	5	30	0	5	26	23	3.60	0.81	.....	15	12.3	S. E.
-6	28	60	13	39	2	4	21	3	7	21	22	4.08	1.00	.....	15	22.2	S. E.
5	24	60	12	25	g	5	12	0	14	17	19	3.14	1.06	.....	14	14.0	W.
9	25	52	11	39	25	3	6	0	5	26	21	2.73	0.65	.....	15	.....	S. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.		BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet	Mean.	Highest.	Date.	Lowest	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.
<i>Central Lakes</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30.3	68
Auburn	Cayuga .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29.6	59
Fleming .....	.....	1000	.....	.....	.....	.....	.....	.....	.....	.....	30.3	29.9	57
Watkins	Schuyler .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30.2	63
Romulus	Seneca	719	.....	.....	.....	.....	.....	.....	72	20	.....	30.4	59
Ithaca	Tompkins	810	30.06	30.54	2	29.51	31	1.03	77	24	30.4	30.7	61
Penn Yan	Yates .....	.....	.....	.....	.....	.....	.....	.....	87	26	.....	31.2	63
Mean .....	.....	.....	30.06	30.62	3	29.27	31	1.04	80	24	.....	28.2	65

* Mean of the tri daily observations. † Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9. p. m.) ÷ 4.
 (1) Voluntary observer. (2) United States Weather Bureau. (1a) City Reservoir; (2a) Intake
 (a) 10, 11; (b) 11, 12; (c) 11, 15; (d) 9, 10; (e) 24, 25; (f) 23, 24; (g) 27, 28; (h) 25, 28; (i) 2, 24;
 (u) 5, 15; (v) 12, 15; (w) 3, 15, 19, 30; (x) 7, 17; (y) 15, 27; (aa) 6, 24; (ab) 2, 5; (ac) 5, 26; (ad)
 (ce) 8, 15; (dd) 12, 31; (de) 5, 6, 12.

FOR DECEMBER, 1897 — (*Concluded*).

TEMPERATURE — (IN DEGREES FAHR).							SKY.			PRECIPITATION — (INCHES).							Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	
2	24	58	13	32	2	2	6	1.4	6.0	23.6	12.5	2.19	1.18	.....	15	.....	.....
2	24	55	14	32		4	15	.....	.....	.....	11	2.92	0.62	.....	15	12.0	N. W.
12	24	55	12	24	8	2	6	0	5	26	5	1.92	0.70	.....	15	8.0	W.
12	24	61	13	28	r	5	15	3	2	26	16	.....	.....	.....	5.8	.....	S. E.
4	24	55	14	20	s	5	15	3	9	19	11	2.01	1.18	.....	15	4.1	S.
3	24	58	11	24	18	3	15	0	9	22	16	2.56	0.50	11.00	31	11.6	S. E.
6	24	61	12	28	25	3	3	1	5	25	16	1.56	0.74	14.00	14-15	5.1	S.
—21	25	61	15	50	h	1	6	4.4	7.5	19.1	13.6	3.83	4.34	24.00	14-15	13.6	S W.

Thermograph. || Report received too late to be used in computing means. The means from the † Blank indicates that the duration is not shown in the original records, but is within 24 hours. conduit, nine miles north of city. § For daily values omitted see temperature table.
(j) 25, 29; (k) 4, 10, 29; (m) 27, 29; (n) 4, 25; (p) 2, 28; (q) 9, 25; (r) 25, 30; (s) 2, 3; (t) 6, 15; 12, 24; (ae) 16, 26; (bb) 3, 8; (bc) 3, 8, 13, 31; (bd) 3, 12; (be) 15, 17, 19; (ce) 15, 17; (cd) 8, 13, 15;

TEMPERATURE—DECEMBER, 1897, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i>	26	21	26	33	31	30	33	35	44	50	48	37	37	38
Altred														
Angelica.....	34	28	30	46	44	35	39	43	53	59	55	42	39	44
	21	6	24	30	28	30	30	30	35	39	38	34	34	35
Bolivar	34	32	33	41	45	34	36	44	53	61	59	40	38	44
	16	5	23	26	25	25	27	21	34	35	38	32	31	34
Franklinville	30	29	27	38	46	31	34	43	51	59	59	39	28	44
	17	3	23	22	26	26	27	21	33	39	38	32	32	33
Humphrey	30	36	28	45	45	29	35	42	55	62	54	37	38	42
	16	13	23	25	24	25	26	27	37	48	35	31	32	33
Arkwright														
Jamestown.....	31	29	32	42	46	31	36	44	54	58	55	40	40	44
	19	17	25	26	26	28	28	28	38	48	38	34	33	36
Elmira	42	32	35	45	35	40	45	47	51	60	59	41	43	42
	23	18	25	34	31	29	29	32	36	40	50	31	35	34
Avon	36	36	38	40	35	32	35	34	39	62	57	51	49	45
	4	19	22	25	20	25	29	31	32	34	40	40	42	34
Lockport.....	35	31	36	42	38	33	39	44	53	60	51	37	45	42
	27	13	22	22	31	27	32	31	38	50	38	33	36	37
Victor.....	31	27	30	44	42	36	39	43	54	60	59	39	41	42
	20	9	17	14	30	24	29	27	36	36	38	33	32	34
Wedgewood.....	36	35	28	38	38	33	36	42	55	60	60	41	38	28
	16	10	20	23	28	21	27	27	35	43	40	32	29	3
Addison	38	33	30	40	38	34	40	44	55	61	60	48	39	42
	22	18	24	28	32	31	32	32	34	35	42	35	35	26
South Canisteo.....	35	29	29	41	40	32	39	42	56	61	59	43	39	41
	14	8	20	22	29	29	26	25	32	38	48	23	29	31
Arcade.....	30	26	26	44	44	32	36	42	50	57	53	37	38	43
	17	3	21	23	26	26	28	22	36	43	35	31	31	31
<i>Eastern Plateau</i>	25	23	23	32	35	30	32	34	42	48	49	41	34	34
Binghamton (1).....	34	33	31	44	44	37	38	42	55	61	60	46	42	40
	19	18	19	27	32	27	32	30	37	40	40	35	32	34
Binghamton (2).....	34	30	28	42	42	35	37	44	56	61	60	44	39	42
	21	18	21	28	32	28	31	33	39	43	44	33	33	34
Oxford	32	32	30	35	38	35	37	42	50	57	57	53	41	41
	14	9	15	22	28	22	24	25	28	28	40	30	28	25
Cortland	31	31	25	35	37	40	35	42	56	58	58	55	40	39
	18	17	18	28	30	21	29	29	38	39	38	30	30	30
South Kortright.....	29	30	29	43	44	33	36	41	51	59	56	52	36	40
	15	12	15	22	28	20	24	21	32	39	30	30	25	25
Bouckville.....	28	27	26	34	37	34	34	37	41	55	55	45	36	39
	15	4	11	17	29	18	23	27	32	37	45	33	28	27
Middletown.....	35	35	26	36	42	37	40	41	49	55	59	53	40	37
	20	23	23	25	33	26	25	20	29	36	36	35	29	30
Port Jervis	35	29	30	33	40	38	39	39	48	55	59	57	40	37
	19	23	23	27	34	28	27	27	30	33	37	42	29	30
Cooperstown.....	39	29	25	41	41	32	36	47	50	58	54	46	34	36
	19	15	19	24	32	24	25	31	32	36	46	33	29	30
Garrattsville.....	31	35	26	39	40	34	38	36	51	60	54	46	38	39
	19	13	17	23	30	24	27	28	33	37	45	34	26	27
New Lisbon.....	29	29	25	40	40	29	35	40	50	59	56	45	35	38
	17	10	15	22	29	22	24	26	32	29	45	31	24	24
Oneonta	35	35	31	46	45	37	40	45	53	62	60	51	40	42
	29	16	20	25	32	25	27	30	36	36	47	32	28	27
Perry City.....	35	27	28	40	38	25	38	41	54	60	58	41	40	41
	16	9	19	24	29	20	27	27	33	37	40	33	32	29
Straits Corners	34	32	28	38	39	37	32	42	53	60	59			38
	16	13	21	25	30	26	30	27	32	36	34			30
Waverly	38	36	31	41	38	38	42	46	57	60	63	49	40	41
	15	17	24	27	32	30	30	28	33	37	49	35	33	35
Dryden	35	28	30	40	40	33	37	42	54	64	59	42	38	40
	20	10	21	26	30	25	30	32	38	43	41	33	30	31
Mohonk Lake.....	30	30	24	36	37	42	34	41	45	52	54	53	39	34
	21	20	20	23	33	24	23	28	29	40	44	34	30	28

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
38	33	34	26	19	20	28	24	16	8	19	29	23	17	20	33	26	29.7
39	43	42	28	21	31	32	27	22	12	34	34	30	24	34	39	34	29.6
37	32	25	17	14	14	26	20	8	-2	3	28	15	9	3	33	17	29.7
43	44	44	36	35	32	36	34	30	22	35	35	33	27	35	36	35	28.1
35	32	22	15	15	16	25	16	9	-1	3	25	17	13	-2	31	17	28.6
42	42	43	42	21	28	33	26	19	11	34	32	29	20	32	34	32	28.8
35	34	25	15	16	11	24	18	11	-1	2	21	12	8	0	31	19	28.2
40	40	41	27	28	31	32	27	18	12	34	31	25	21	32	33	32	28.8
35	31	24	14	16	13	23	15	8	0	6	24	15	14	11	30	15	28.8
42	42	34	32	22	34	35	26	20	16	34	32	26	26	34	36	34	30.2
37	34	28	17	18	20	26	20	11	5	6	26	20	16	16	33	19	32.2
44	48	45	45	25	30	32	35	25	20	41	34	30	25	33	42	40	30.6
40	37	29	20	16	14	25	23	15	4	4	27	20	9	10	22	20	33.2
41	40	45	39	24	30	32	25	16	25	37	30	25	15	35	38	32	33.2
35	34	35	31	12	5	16	15	1	2	2	20	17	12	12	32	21	29.0
43	43	31	23	24	30	32	25	16	15	1	2	20	17	12	32	19	28.1
33	20	25	18	16	12	20	17	11	2	6	27	16	15	11	31	20	31.1
41	46	39	31	21	28	29	31	22	11	37	36	28	25	32	38	32	29.1
35	33	25	17	10	6	20	17	11	2	6	27	16	15	11	31	20	27.5
39	50	53	25	20	24	29	29	23	14	31	34	27	26	28	40	33	28.5
35	35	23	17	10	6	18	16	6	-2	-1	24	12	7	8	27	17	30.1
44	47	43	42	24	28	33	31	25	18	35	34	31	24	32	41	37	30.0
34	37	26	21	17	14	28	17	13	4	2	18	22	8	7	32	20	27.4
43	46	44	32	22	29	34	20	24	14	36	35	30	23	31	39	39	28.6
31	31	21	18	16	10	26	17	10	-1	2	28	18	4	5	25	19	25.6
39	41	41	35	19	30	32	27	19	10	34	32	26	25	33	35	31	29.8
34	32	25	15	14	8	23	17	5	-4	6	23	13	4	8	30	14	29.9
39	40	35	29	16	16	24	24	19	9	15	26	24	14	14	31	29	27.8
45	45	40	46	22	26	28	30	23	13	29	34	29	23	28	40	32	27.4
37	35	25	20	12	10	23	19	12	3	2	22	18	15	3	28	20	27.4
42	46	46	33	20	28	29	32	23	11	34	32	28	19	34	40	34	27.4
39	37	30	19	12	10	24	21	11	2	4	25	18	12	0	34	18	26.2
42	44	42	42	26	25	32	31	29	18	30	34	32	25	25	40	35	30.6
34	32	22	17	10	5	17	15	8	0	-2	17	18	0	-6	18	25	27.6
43	44	44	43	22	24	28	26	28	21	21	23	32	26	25	38	38	28.6
26	35	25	18	10	11	21	16	17	1	-1	1	21	11	3	24	28	27.4
54	44	43	42	21	29	29	3	27	25	26	35	31	20	24	39	36	25.6
33	35	25	17	5	3	12	15	11	0	0	17	14	3	-4	20	23	29.8
40	43	40	27	15	22	28	28	26	17	22	29	22	17	22	39	37	29.9
34	33	32	17	3	2	19	11	7	0	3	20	16	-6	-1	21	24	27.8
49	45	45	12	24	20	25	30	29	16	28	29	30	31	29	38	31	27.4
37	29	35	21	15	10	18	23	16	5	8	20	20	12	9	22	20	29.9
50	46	35	36	25	20	31	33	29	13	26	33	35	26	28	41	36	27.8
35	36	33	26	20	12	21	22	16	5	7	18	22	8	3	19	29	27.4
43	44	41	41	20	25	25	27	23	15	28	32	29	18	25	38	32	26.2
35	35	29	20	7	5	22	19	14	3	2	24	17	0	-5	22	27	30.6
44	43	41	35	20	24	29	30	26	15	26	34	30	29	25	42	34	27.6
35	34	25	17	6	5	14	15	19	2	1	23	19	-2	-4	20	24	28.3
43	43	41	43	19	24	27	28	25	8	26	31	28	19	23	38	33	31.0
34	35	23	19	4	3	19	15	7	1	0	21	16	-6	-10	20	24	29.3
48	47	46	25	19	31	36	35	30	18	33	37	34	23	30	43	37	28.6
36	37	30	22	11	7	25	20	15	5	7	25	21	8	-1	12	26	27.6
41	46	38	32	20	26	29	33	22	12	31	34	27	23	30	40	29	28.2
35	32	23	17	12	6	17	17	9	0	3	23	16	7	4	26	18	28.6
40	45	42	42	25	25	25	30	23	23	17	32	53	25	26	40	36	31.0
37	34	26	19	14	9	17	16	13	0	-2	21	17	11	-1	25	25	29.3
42	51	45	45	25	37	43	33	26	22	34	36	34	23	30	44	36	28.6
38	36	24	20	19	11	27	13	10	0	-5	24	20	2	2	28	21	29.3
40	45	44	35	20	26	30	32	24	16	30	33	30	22	30	41	35	28.6
36	35	25	18	11	11	17	17	8	2	3	25	16	12	6	30	18	28.6
50	43	43	43	31	20	33	26	28	15	22	25	26	21	29	37	34	28.6
34	38	34	22	15	7	19	20	14	4	9	16	16	10	10	20	20	28.6

TEMPERATURE -- DECEMBER, 1897, SHOWING DAILY MEANS FOR STATIONS

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Northern Plateau..</i>	17	14	16	20	27	26	25	29	34	41	45	37	31	33
<i>Elizabethtown.....</i>					8	14	32	36	44	50	56	40	36	42
<i>Lake Placid.....</i>	25	22	26	31	38	29	30	36	46	53	50	49	45	38
<i>Saranac Lake.....</i>	11	1	11	3	17	8	13	26	25	33	46	38	24	26
<i>Gloversville.....</i>	25	22	26	42	33	30	32	37	51	56	54	34	34	52
<i>Little Falls (2a)...</i>	1	2	-2	10	8	9	26	23	30	40	32	26	25	30
<i>North Lake.....</i>	29	30	24	33	37	34	31	36	40	49	54	40	35	36
<i>Lowville.....</i>	14	15	12	9	32	16	18	28	28	26	34	33	28	28
<i>Number Four.....</i>	25	30	24	25	38	32	37	33	42	45	55	39	35	38
<i>Atlantic Coast.....</i>	15	9	4	12	24	14	14	15	19	26	38	34	26	27
<i>Brooklyn.....</i>	19	25	19	25	38	38	32	31	35	45	52	47	35	32
<i>New York City.....</i>	6	2	1	6	24	11	12	24	27	35	39	37	25	27
<i>Willeys Point.....</i>	26	29	28	35	38	32	35	38	44	55	52	45	36	38
<i>Brentwood.....</i>	8	-9	11	1	32	6	16	30	30	33	42	31	28	30
<i>Setauket.....</i>	26	24	25	37	38	27	31	37	45	51	49	37	32	38
<i>Bedford.....</i>	5	-3	13	11	27	10	21	27	31	36	37	28	25	27
<i>Hudson Valley.....</i>	32	34	31	38	42	36	37	44	46	52	45	38	43	
<i>Albany.....</i>	42	35	33	48	45	39	45	41	51	55	63	49	43	47
<i>Honeymead Brook..</i>	25	30	30	29	36	35	32	33	35	36	46	41	35	36
<i>Willets Point.....</i>	42	38	34	48	45	42	45	41	53	56	60	53	42	56
<i>Brentwood.....</i>	27	28	29	29	34	34	33	33	37	41	46	37	36	40
<i>Setauket.....</i>	42	38	35	50	49	43	45	40	54	56	64	49	47	54
<i>Bedford.....</i>	26	29	28	33	36	32	33	32	33	41	33	34	31	40
<i>Primrose.....</i>	45	46	34	50	49	51	48	48	61	56	58	54	55	57
<i>Greenwich.....</i>	15	26	29	30	33	21	22	30	39	31	44	38	27	37
<i>Hudson Valley.....</i>	43	40	36	48	52	40	42	44	55	57	60	53	41	45
<i>Albany.....</i>	25	31	28	32	38	30	30	35	36	36	47	40	33	38
<i>Honeymead Brook..</i>	38	39	32	39	47	44	43	36	53	58	62	55	51	44
<i>Wappingers Falls..</i>	20	25	26	27	36	27	26	30	33	30	41	40	29	30
<i>Catskill.....</i>	40	36	32	38	47	40	41	42	52	57	62	48	47	46
<i>West Point.....</i>	20	29	27	29	36	29	25	30	32	30	35	41	25	27
<i>Albany.....</i>	27	28	25	30	33	31	30	33	38	44	49	44	35	34
<i>Honeymead Brook..</i>	35	36	28	39	44	34	26	26	46	56	58	45	39	39
<i>Poughkeepsie.....</i>	23	22	23	19	34	24	24	32	34	39	45	38	29	29
<i>Wappingers Falls..</i>	33	29	28	39	43	33	37	40	49	57	57	41	39	42
<i>Catskill.....</i>	19	21	23	25	32	26	26	31	34	35	44	36	26	26
<i>West Point.....</i>	35	31	28	35	48	38	31	37	50	58	62	50	42	42
<i>Greenwich.....</i>	21	25	23	26	34	25	22	29	32	30	40	34	24	27
<i>Albany.....</i>	34	34	28	34	41	38	39	38	48	58	60	61	48	40
<i>Honeymead Brook..</i>	22	25	22	24	32	26	25	30	30	32	38	36	26	28
<i>Poughkeepsie.....</i>	33	35	27	36	47	41	34	35	47	54	58	53	42	39
<i>Wappingers Falls..</i>	23	23	23	24	35	25	24	31	36	41	41	39	31	30
<i>Catskill.....</i>	30	37	32	34	42	40	40	46	36	42	49	58	43	40
<i>West Point.....</i>	22	25	25	26	29	30	27	28	27	36	37	40	30	30
<i>Greenwich.....</i>	39	32	29	37	42	36	38	36	50	55	50	45	42	39
<i>Albany.....</i>	20	18	24	27	37	24	25	26	34	37	41	35	31	30
<i>Honeymead Brook..</i>	30	32	24	37	39	35	33	36	41	50	57	55	36	38
<i>Poughkeepsie.....</i>	13	16	12	17	27	21	19	25	23	30	42	34	32	25
<i>Wappingers Falls..</i>	23	20	21	28	30	29	29	34	36	43	50	37	33	36
<i>Catskill.....</i>	31	29	22	38	31	33	31	33	41	53	60	35	34	41
<i>West Point.....</i>	8	7	11	21	16	16	16	17	34	36	55	28	28	31
<i>Greenwich.....</i>	34	38	29	34	38	32	36	40	40	45	59	40	40	41
<i>Albany.....</i>	26	15	22	23	33	24	29	33	33	31	38	35	33	36
<i>Honeymead Brook..</i>	30	32	28	34	38	52	55	52	52	55	64	49	39	37
<i>Poughkeepsie.....</i>	19	13	18	19	33	30	28	30	27	37	36	38	30	31
<i>Wappingers Falls..</i>	30	22	28	35	31	27	30	37	39	50	56	40	35	40
<i>Catskill.....</i>	8	8	13	24	18	17	26	28	20	38	35	29	28	32
<i>Albany.....</i>	20	22	18	21	32	26	25	31	35	40	46	40	33	31
<i>Honeymead Brook..</i>	24	31	24	30	38	40	29	33	36	43	50	55	36	34
<i>Poughkeepsie.....</i>	14	16	10	13	13	15	14	30	29	30	37	34	30	21
<i>Wappingers Falls..</i>	31	33	25	29	42	40	36	37	41	51	57	57	38	38
<i>Catskill.....</i>	14	17	11	10	22	20	19	29	28	34	40	32	35	26
<i>West Point.....</i>	30	30	25	32	38	25	32	32	40	47	55	37	33	39
<i>Greenwich.....</i>	9	12	10	7	28	18	19	27	23	28	40	33	26	25
<i>Albany.....</i>	31	28	28	36	43	28	34	36	44	52	54	37	38	38
<i>Honeymead Brook..</i>	8	13	10	8	35	22	20	26	33	33	35	33	28	26

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
—(Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
39	37	32	23	6	7	13	12	14	3	6	23	19	3	10	27	27	22.4
50	44	42	38	16	14	14	20	23	14	22	30	36	30	30	40	44	22.2
34	34	24	0	0	4	0	-5	-5	-10	-8	20	26	-6	-6	10	14	
51	38	35	36	10	29	21	21	17	17	22	32	27	14	25	33	32	22.8
38	30	25	9	-6	-6	14	-1	2	-7	-10	22	14	-11	-4	25	21	
52	37	36	18	9	16	22	25	20	1	28	31	20	16	32	36	28	19.8
32	27	15	-5	-9	-5	-10	-4	-6	-19	-13	18	15	-15	-3	18	7	
44	46	42	37	18	16	27	21	21	13	21	31	28	20	19	40	33	24.8
35	37	29	18	2	4	13	8	13	0	0	16	15	-1	-4	19	25	
40	41	40	41	22	12	24	24	26	20	11	28	31	24	24	41	40	23.6
32	35	26	20	-3	-3	4	19	2	-4	-1	12	2	-3	9	25	27	
42	41	38	35	19	10	22	23	22	18	12	24	26	2	14	30	32	20.2
32	32	26	16	-5	-6	-3	-5	15	-7	-12	-1	18	-16	-15	6	22	
41	42	41	37	17	20	21	26	25	17	21	31	29	16	21	35	33	23.7
35	35	29	17	-3	-4	12	0	16	-7	-9	19	13	-12	-4	19	20	
40	37	37	37	12	21	21	24	20	8	24	28	26	9	23	32	29	21.8
33	32	26	8	-6	-5	5	0	6	-8	-13	23	4	-12	-3	22	19	
49	44	44	34	26	24	33	31	26	16	21	30	30	22	24	40	37	34.9
51	48	43	35	31	30	38	35	32	29	31	35	35	28	37	46	41	35.6
45	40	41	33	24	19	30	30	23	11	14	23	27	20	18	34	36	
56	47	50	46	29	30	38	35	30	20	28	34	36	31	37	47	43	36.0
45	40	42	26	20	16	29	29	20	9	13	26	24	20	18	34	33	
56	45	51	43	36	34	39	34	32	22	31	34	38	33	39	48	44	35.3
39	38	31	24	18	18	29	26	10	15	24	19	14	28	32	23	23	
54	50	50	34	33	33	38	38	31	22	29	34	39	34	42	52	48	35.2
43	35	30	24	19	19	29	25	20	19	12	28	23	10	5	38	27	
60	49	48	50	28	33	37	36	33	26	30	34	36	27	40	47	48	36.7
45	42	42	28	21	20	32	29	26	12	16	27	27	21	19	37	34	
65	49	53	46	34	27	35	32	32	22	31	34	39	33	30	46	47	33.4
42	38	38	24	18	13	27	23	20	8	9	22	21	8	-1	28	30	
67	50	50	38	31	23	37	35	32	17	31	33	39	29	30	45	39	32.2
38	35	36	30	22	15	26	27	22	9	9	26	10	8	1	26	24	
45	43	40	34	22	18	26	25	26	16	17	27	23	16	14	31	32	30.3
48	48	45	42	21	26	32	24	29	15	27	20	34	23	26	45	38	
38	41	34	21	12	10	19	14	15	7	6	26	18	19	4	24	27	29.0
54	46	45	33	23	23	33	32	30	16	24	32	37	20	26	42	37	29.5
42	31	29	25	12	9	21	20	9	7	0	22	19	7	-1	26	26	
54	47	43	47	41	41	40	45	48	44	48	45	47	46	45	44	39	33.4
40	34	33	25	15	10	21	20	18	10	8	23	13	-4	-3	26	25	
56	56	48	38	28	22	35	32	35	21	29	35	38	22	22	45	35	31.3
38	42	35	25	19	11	20	22	21	7	9	22	22	7	1	25	22	
49	49	45	44	27	22	33	27	30	21	26	30	41	24	23	41	40	31.2
39	38	35	27	17	10	22	19	18	10	8	21	23	10	4	21	29	
52	55	48	48	34	34	34	35	57	36	37	37	37	30	31	30	39	31.0
36	40	39	30	21	13	13	25	20	12	13	13	19	12	3	4	24	
54	49	50	44	25	24	34	33	30	18	28	33	31	22	25	41	35	30.8
42	41	36	30	17	11	21	21	18	7	6	23	17	6	1	25	31	
46	44	44	43	25	16	29	25	24	21	19	29	30	25	19	40	36	26.3
34	32	29	25	8	8	15	5	12	2	-9	13	23	-3	-3	18	30	
39	40	35	22	14	14	20	20	16	6	17	26	18	9	15	32	26	26.5
39	44	41	21	6	20	22	19	20	5	29	30	23	4	37	38	30	23.4
34	29	20	1	3	5	11	15	0	-3	1	23	0	1	8	27	9	
44	47	50	45	27	20	27	26	27	22	22	30	31	25	25	42	40	29.4
40	40	32	24	9	10	18	17	17	2	6	19	19	6	1	21	30	
44	50	46	40	23	18	28	25	26	21	45	32	31	25	21	41	40	29.2
36	39	30	22	5	6	16	14	16	1	2	18	22	0	-4	19	30	
39	45	32	25	41	24	25	25	25	7	28	30	26	15	30	39	22	24.0
36	28	29	2	1	7	12	15	0	-3	1	22	-5	-5	5	30	10	
40	38	36	28	13	11	18	14	16	13	6	23	25	10	8	27	33	25.2
38	41	43	38	21	9	21	20	24	26	6	30	32	26	12	33	40	23.6
35	35	31	18	2	0	6	5	5	5	-4	0	25	0	-2	2	30	
47	46	46	41	25	18	24	23	27	25	21	33	33	24	22	43	40	27.4
37	31	34	25	8	10	16	6	4	10	-5	17	24	0	-1	20	29	
46	46	40	28	18	18	28	22	17	15	22	30	30	15	20	41	32	23.9
36	32	28	19	7	7	7	3	11	3	-7	22	15	-1	-4	13	28	
46	46	42	37	19	19	30	23	27	15	23	31	31	19	22	43	40	25.9
36	31	28	20	7	7	10	6	10	3	-5	23	12	-1	-1	21	27	

TEMPERATURE — DECEMBER, 1897, SHOWING DAILY MEAN
STATIONS—

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>St. Lawrence Valley</i>	24	16	23	23	31	21	28	35	39	48	48	36	32	34
Madison Barracks.	34	35	28	31	41	40	32	36	42	52	61	57	34	45
Canton.	19	0	14	6	8	13	11	29	26	38	50	32	29	27
.....	31	25	29	38	40	30	35	41	50	58	54	35	33	36
.....	14	-2	12	6	29	16	28	29	29	42	35	30	30	28
North Hammond...	32	32	32	40	42	30	36	40	44	60	58	38	34	36
.....	20	8	20	16	28	10	30	34	36	38	38	32	28	28
Ogdensburg	32	29	32	30	39	27	35	41	50	59	52	38	35	39
.....	14	4	14	14	29	9	17	32	35	40	34	28	29	29
<i>Great Lakes</i>	28	21	26	31	36	29	34	38	46	53	48	37	39	39
Westfield	35	32	32	46	44	35	40	48	58	62	61	41	43	47
.....	22	22	24	21	29	30	31	33	32	55	39	35	35	38
Buffalo	33	30	31	46	39	34	37	47	55	59	57	38	43	46
.....	20	17	23	23	31	28	31	34	43	54	38	33	36	38
Pittsford	34	28	30	45	34	32	41	45	57	63	58	41	41	44
.....	23	9	19	17	31	26	31	32	40	43	38	34	34	34
Rochester	33	27	30	47	41	33	38	46	57	62	57	38	42	44
.....	22	12	21	21	32	26	31	34	41	48	33	35	35	35
Appleton	34	30	34	40	40	36	38	42	52	60	57	39	41	43
.....	22	9	24	19	32	26	30	30	35	40	39	31	35	35
Fort Niagara	34	33	36	40	43	35	39	47	54	63	58	45	46	47
.....	22	17	24	19	30	25	30	30	35	48	38	33	34	35
Baldwinsville	34	28	30	43	43	32	39	43	.....	.....	.....	.....	.....	42
.....	23	7	17	17	31	18	26	32	.....	.....	.....	.....	.....	31
Ridgeway	33	30	30	42	44	33	38	43	55	63	58	39	42	42
.....	23	11	23	19	31	23	30	30	35	44	58	34	35	34
Oswego	34	28	27	42	39	33	36	42	47	59	58	40	39	39
.....	22	9	20	21	33	20	28	33	37	41	40	33	32	32
Palermo	32	30	22	37	37	34	34	40	43	50	54	40	38	37
.....	20	0	12	14	32	15	18	30	33	38	38	33	33	32
Lyons	37	28	30	42	42	35	40	45	65	57	61	40	41	43
.....	20	12	21	20	33	24	34	35	40	44	40	35	34	33
Erie, Pennsylvania.	34	29	32	47	37	32	38	50	60	61	61	41	43	47
.....	25	22	26	27	28	29	31	32	44	57	39	35	37	42
<i>Central Lakes</i>	28	22	27	32	37	30	34	37	47	50	52	38	37	38
Auburn	34	35	31	40	43	40	37	47	59	59	58	40	43	43
.....	20	3	20	15	31	18	31	31	37	44	40	34	31	31
Fleming	33	32	28	40	42	33	36	44	56	56	57	46	40	42
.....	20	13	20	23	31	31	21	20	37	45	44	34	33	32
Watkins	37	34	29	42	41	34	41	46	58	63	63	46	40	42
.....	20	16	25	29	32	25	31	30	37	41	46	33	34	35
Romulus	36	31	42	30	42	37	40	46	56	58	59	45	42	43
.....	22	11	22	22	32	21	31	31	38	39	41	33	33	33
Ithaca	36	29	28	41	40	34	38	43	56	60	61	43	38	41
.....	21	15	23	28	33	26	31	33	39	46	43	34	32	33
Penn Yan	36	31	28	41	41	33	40	44	56	60	63	44	42	42
.....	21	14	25	28	32	23	31	32	39	38	43	32	35	35
Mean.....	25	22	24	29	34	28	31	34	40	46	49	39	35	36

† Max. and Min. by the Draper Thermograph.
Conduit, nine miles north of city.

|| Received too late to be used in computing

FOR THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE
(Concluded).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
37	38	35	19	3	5	12	14	20	1	7	28	17	4	14	30	26	24.2
43	39	44	35	23	9	22	32	36	21	12	36	33	24	22	35	36	25.4
33	33	29	22	-2	-1	7	5	21	-3	-11	9	21	-11	7	18	23	
38	42	41	19	7	13	16	25	26	10	29	34	30	15	29	38	33	22.1
34	33	27	2	-15	-10	-4	-12	9	-17	-21	19	-7	-15	-14	18	15	
40	44	38	20	10	12	20	22	24	10	26	36	30	12	28	38	30	25.6
34	36	28	10	0	-2	12	10	10	-10	0	26	8	-2	10	24	26	
39	42	47	20	9	22	16	24	28	8	34	35	31	18	28	38	28	23.6
34	35	26	3	-6	-4	5	5	4	-9	-12	23	1	-8	1	20	16	
39	40	33	24	17	19	27	24	18	10	22	31	22	18	24	35	27	29.9
48	45	44	28	25	36	34	32	22	18	37	36	30	28	36	38	36	32.2
38	35	28	18	21	6	28	20	12	9	10	29	22	20	16	33	20	
44	44	34	24	19	30	31	30	21	13	37	34	27	25	37	37	33	30.0
37	32	24	15	11	10	24	20	5	1	9	27	14	16	19	32	17	
42	45	39	33	18	29	30	32	23	14	38	36	28	26	35	39	34	30.3
35	36	26	18	14	9	23	26	13	2	11	27	17	15	20	30	19	
43	45	36	24	19	28	28	29	22	12	38	34	28	25	36	38	32	30.0
35	31	24	18	12	13	22	18	6	5	7	27	17	15	17	32	20	
43	45	38	31	22	27	32	29	24	17	35	34	26	27	34	38	34	30.2
35	36	26	16	15	12	20	20	14	5	5	26	20	18	15	34	21	
46	46	40	35	23	25	35	30	24	17	35	35	29	30	37	40	26	31.2
34	38	24	13	16	11	24	22	15	4	5	29	18	15	14	29	20	
42	45	42	34	19	26	29	29	24	13	33	36	20	15	30	40	34	26.4
36	35	27	18	7	10	22	26	12	4	9	27	6	4	6	28	18	
43	45	36	30	20	28	30	30	28	14	35	35	28	27	34	38	33	29.9
34	36	26	15	14	8	50	19	12	4	5	27	18	15	15	32	20	
42	45	40	29	20	23	28	30	26	16	36	35	29	17	34	39	36	29.0
38	37	29	26	6	9	21	19	14	6	11	29	13	4	10	34	22	
40	44	42	37	21	20	24	27	23	13	28	33	29	16	26	38	35	26.3
35	35	28	19	5	5	20	13	10	5	6	18	16	-6	6	25	20	
43	46	40	31	22	31	31	33	25	15	38	38	29	25	34	41	36	31.4
33	36	29	21	15	14	25	23	12	5	13	29	21	14	17	33	19	
42	46	44	23	25	34	33	27	22	18	39	34	28	26	39	40	36	32.0
38	31	23	18	19	19	28	19	15	10	9	28	23	16	15	34	19	
39	41	35	29	17	17	26	26	19	9	21	29	25	10	21	33	28	30.3
40	45	42	30	21	17	30	33	25	17	30	35	33	29	30	42	33	29.6
36	35	23	20	7	7	24	19	15	3	16	27	17	10	10	23	19	
41	43	42	41	23	24	28	30	26	18	31	33	31	24	28	40	35	29.9
37	36	27	20	12	9	22	22	15	2	10	27	18	13	13	26	20	
43	49	44	43	22	26	32	32	25	15	33	35	31	22	30	44	37	30.2
38	37	25	20	16	10	13	17	15	2	5	20	17	13	11	16	25	
42	46	42	36	24	27	30	32	26	14	35	35	32	25	31	43	36	30.4
37	36	28	19	12	13	22	20	10	4	9	9	18	14	14	24	21	
41	46	44	44	22	26	29	30	24	13	30	33	31	20	28	42	35	30.7
33	28	29	20	15	13	23	22	13	3	7	27	20	15	11	26	20	
42	48	42	41	23	27	30	31	25	15	36	36	31	24	31	41	35	31.2
37	37	28	19	10	10	25	22	14	2	8	29	20	17	17	29	23	
40	40	36	27	15	15	23	21	19	9	15	27	23	13	16	32	29	28.2

means. (1) Voluntary observer. (2) U. S. Weather Bureau. (1a) City Reservoir. (2a) Intake

DAILY AND MONTHLY PRECIP

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Western Plateau</i> ...	0.05	0.02	0.04	0.08	0.07	0.03	0.12	0.01	T.	0.01	0.16	0.06	T.	0.35
Alfred.....														
Angelica.....	T.	T.		.02	.24	T.	.30			.16	.12	.03		.20
Bolivar.....	.05			.08	.34	T.	.30		T.	T.	.15	T.		.29
Franklinville.....	.05	.05		.02	.40	.09	.25				.26	.03		.23
Humphrey.....	.10			.35	.01	.04	.35				.19	.03		.21
Little Valley.....														
Napoli.....	.18	.03		.03	.36	.05	.21		.01		.27	.07		.38
Cherry Creek.....	.19	.05		.10	.35	.07	.28		.06		.35	.11		.51
Jamestown.....	T.	.20		.03	.25	T.	.27				.25	.02		.70
Elmira.....												.10		.21
Pine City.....	T.		.07	.07	.34					T.	.06	.12		T.
Akron.....	T.	T.	.49	T.		T.					.67			1.00
Avon.....	.05				T.	.05	T.					.05		.30
Mt. Morris.....	.10		T.	T.	T.		T.				.10	T.		.15
Nunda.....														
L. ckport.....														
Vicor.....														
Wedgewood.....	T.	T.	T.	.10	T.	T.	T.				T.	.30		.50
Addison.....	T.	T.	.02	.07	.12		T.				T.	.07		.25
Atlanta.....				.37				.16			.03	.07		
Haskinville.....	T.			T.	.20	.20	T.	T.			.10		T.	.10
South Canisteo.....	.08		.07	.21	T.		.10				.05	.10		.80
Arcade.....	.10	.01		.02	.40	.05	.22		T.		.23	.06		.48
<i>Eastern Plateau</i> ...	0.05	T.	0.03	0.34	0.36	0.01	0.08	T.	0.00	0.00	0.04	0.24	0.02	0.50
Binghamton (1).....			.10	.14	.76	.02					.04	.38		.54
Binghamton (2).....	.01	T.	.04	.15	.62	.01	T.				.02	.51	T.	.14
Chenango Forks.....														
Oxford.....	.05		.02	T.	.86	.02	.05	.03			T.	.25		.22
Cortland.....			.02				.98					.15	.20	.30
South Kortright.....				*	†.92							.54	*	*
Bouckville.....	.30				.75		.10							.25
Fayetteville.....	.03	.01	.01	.15	.55	.04						.08		.24
Middletown.....			*	*	†1.05		.15					.45		*
Port Jervis.....			.11	1.40			.05				.63		.14	1.46
Warwick.....				.27	.48		.02					.40		.90
Cooperstown.....	.07		.06	1.23			.07					.32		1.00
Garrattsville.....	.30						*	†1.05						
New Lisbon.....	.01			.24	.83		.03					.30		.43
Oneonta.....	.11			1.20								.49	.05	1.16
Schenevus.....														
Perry City.....	.08		T.	.10	.32	.09	T.				T.	.12		.43
Newark Valley.....				.20	.35	T.	T.				T.	.15		.30
Straits Corners.....	.05		.10	.25		T.	T.	T.			T.			.46
Waverly.....	.02		.07	.10	.22	T.	T.				.02	.10	.02	.24
Dryden.....														
Mohonk Lake.....				*	†1.08							.54		*
<i>Northern Plateau</i> ...	0.14	0.06	0.05	0.43	0.64	T.	0.12	0.06	0.00	T.	0.12	0.13	T.	0.98
Elizabethtown.....														
Lake Placid.....	T.	T.			.45		T.				T.	.15		.60
Saranac Lake.....	.05	T.	T.		.58			T.			.09	.05		.47
Gloversville.....	.13		.14	.47	1.11		.18	T.			.08	.19		1.47
Little Falls (2a).....	T.	.20		T.	1.83	T.	.13	.50			.40	.14	T.	1.60
North Lake.....	.20			1.40			.20				.21			.93
Lowville.....	.10	.16	.07		.41		.08				.12	.02		.12
Number Four.....	.50		.10	.54	.12		.03			.03	.09	T.		*
Kings Station.....	.10		.10	1.00	.60		.35					.50	.05	1.70
<i>Atlantic Coast</i>	0.00	0.00	0.14	0.34	0.23	0.00	T.	T.	0.00	T.	0.04	0.42	0.02	1.98
Brooklyn.....			.15	.28			T.				T.	.28		1.96
Manhattan Beach.....														
New York City.....			.12	.20	.45		T.					.45		1.65
Willels Point.....			.10	.65						T.	.22	.19	.15	2.00

TATION FOR DECEMBER, 1897—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.58	T.	0.21	0.04	0.02	0.09	0.05	0.05	0.17	0.04	T.	0.02	0.02	T.	0.17	0.13	0.33	3.01
.56	.....	.27	T.	T.	T.	T.	.18	.30	.10	.....	.....	T.	.....	.10	.12	.50	3.10
.69	.02	.40	T.	T.	.16	.10	.04	.18	.....	.....	T.	T.	.....	.17	.10	.29	3.02
.95	.....	.25	.18	.03	.10	.04	.04	.20	.16	.03	T.	.01	T.	.14	.22	.28	4.01
.81	.....	.12	.06	.02	.10	.04	.10	.40	.....	.....	.02	.03	T.	.25	.32	.04	3.59
.85	.....	.29	.08	.04	.09	.05	.03	.40	.07	.....	.05	.05	.02	.19	.30	.29	4.39
.75	.....	.38	.17	.05	.30	.11	.07	.42	.18	T.	.04	T.	.....	.25	.35	.16	5.30
.48	.....	.28	.10	.15	T.	.10	T.	.50	.20	.....	T.	.20	T.	.30	.20	.10	4.32
.63	.....	.03	.....	.....	.13	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.48	1.60
.61	.....	.05	T.	.03	.15	.04	.05	T.	T.	T.	T.	.05	.....	T.	.....	.40	2.04
.45	T.	.50	T.	T.	T.	.03	.03	.07	.02	.....	T.	.03	.05	.65	.18	.03	4.20
.86	.....	.12	T.	.....	.....	T.	.08	T.	.....	.....	T.	.....	.....	.....	.14	T.	1.65
.10	.....	.15	T.	T.	.....	T.	T.	.20	.....	.....	.20	.....	.....	.30	.10	.40	1.80
.....
.05	.02	.07	T.	T.	.09	T.	.05	.05	T.	.....	T.	T.	T.	.10	T.	.60	1.93
.42	.....	.10	.01	T.	.11	T.	.03	.03	.....	.....	.....	.....	.....	.03	.....	.65	1.91
.95	.....	.22	.....	.....	.10	.....	.06	.....	.....	.....	.....	.....	.....	.20	.....	.85	3.01
.94	.....	.10	T.	.04	.05	.05	.05	.....	T.	.....	T.	.....	T.	.05	.10	.12	2.10
T.	.....	.28	T.	T.	.16	.08	.10	.....	.....	.....	T.	.....	.....	.15	.10	.40	2.71
.49	.....	.27	.07	.02	.03	.02	.03	.30	.05	T.	.01	.01	T.	.13	.18	.29	3.47
0.56	0.01	0.03	0.01	0.01	0.14	0.03	0.08	0.03	0.01	T.	0.08	0.01	T.	0.09	0.06	0.80	3.86
.65	.....	.05	.....	.....	.05	.....	.20	.....	.10	.....	.10	.....	.....	.20	.10	.80	4.03
.44	T.	T.	.02	.01	.04	.02	.08	.01	T.	.....	.05	T.	T.	.05	T.	1.20	3.23
.77	.03	.01	T.	T.	.13	.05	.10	.08	T.	T.	.25	.05	T.	T.	.25	.80	4.01
.70	.20	.20	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.00
+1.37	.....	.....	.....	.....	.....	.....	.18	.....	.....	.....	.....	.....	.....	.09	.....	.92	4.02
.53	.....	.....	T.	.....	.10	.10	.20	.10	.....	.....	.10	T.	.....	.20	.30	.40	3.43
.57	.03	.05	.04	.03	.03	.05	.08	.02	.03	.01	.....	.03	.....	.07	.04	.35	2.54
+2.31	.....	T.	.....	T.	.27	.....	.12	.12	.....	.....	.24	.....	.....	.25	.....	.87	5.71
1.00	.....	.....	.....	.....	.05	.25	.07	.08	.....	.....	.15	.....	.....	.....	.15	1.17	6.71
.72	.....	.....	.....	.....	.10	.05	.05	.05	.....	.....	.14	.....	.....	.62	.....	1.00	4.15
.27	.....	.08	.....	.....	.22	.....	.08	.03	.....	.....	.14	.....	.....	.18	.05	.85	4.04
.....	.....	.....	T.	.....	.05	.....	.....	.03	.....	.....	.....	.....	.....	.20	*	+85	2.45
.54	.02	.....	.....	.....	.16	.....	.06	.....	.....	.....	.08	.....	.....	.....	.10	1.40	4.20
.19	.....	.....	.....	.....	.54	.....	.....	.....	.....	.....	.12	.....	.....	.42	.....	1.02	5.80
.70	.....	.14	T.	.07	.10	T.	.08	.05	.....	.....	.03	.03	T.	.05	.02	.45	2.86
.65	.....	T.	.02	T.	.08	T.	.08	.03	T.	.....	.07	T.	.02	.....	.90	2.85	.....
.50	.....	.....	T.	.02	.07	T.	.02	.05	.....	T.	.05	.....	.....	T.	.05	.50	2.12
.61	.....	.01	.04	.02	.40	.....	.06	.02	.....	.....	.05	.....	.....	.04	.....	.60	2.70
+2.32	.....	.....	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	.....	.20	.....	1.20	5.44
0.39	T.	0.08	0.06	0.01	0.14	0.04	0.18	0.10	T.	T.	0.02	0.02	0.00	0.12	0.42	0.34	4.59
T.	T.	.....	T.	.....	.20	.10	.10	T.	.....	.....	.....	.....	.....	.....	.30	.....	1.90
.09	.....	.14	.....	.....	.....	.12	.....	.06	.....	.....	.....	.03	.....	.....	.16	.38	2.22
.87	.....	.03	.10	.....	.15	T.	.05	.07	T.	.....	.03	T.	.....	.15	.60	.70	6.52
.05	T.	.22	.06	.....	.24	.....	.13	.11	.....	T.	.10	T.	.....	.50	.....	.14	6.46
.50	.....	.20	.....	.10	.20	.....	.20	.30	.....	.....	.....	.....	.....	.....	1.30	.....	5.74
.84	.02	.05	.26	.....	.02	.06	.....	.04	.....	.....	.....	.09	.....	.....	.36	.20	3.02
.87	T.	.12	.04	.....	*	+ .15	.88	.19	.....	.....	.03	.04	.....	*	.45	.42	4.60
.37	.....	.....	.....	.....	.15	.....	.05	.....	.....	.....	.....	.....	.....	.20	.20	.90	6.27
0.54	0.00	T.	T.	0.00	0.07	0.07	0.02	T.	T.	0.00	0.29	T.	0.00	0.04	0.08	0.86	5.20
.36	.....	T.	.01	.....	T.	.14	.02	T.	T.	.....	.23	.....	.....	.....	.17	1.09	4.74
.50	.....	T.	T.	.....	.07	.10	.03	T.	T.	.....	.21	T.	.....	T.	.12	.90	4.83
.....	.....	.....	.....	.....	.09	.....	T.	.....	.....	.....	.44	.....	.....	.15	T.	1.07	5.06

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Atl. Coast — (Con.)</i>														
Brentwood.....														
Setauket.....			.22	.18	.42		T.					.60		3.10
Bedford.....			T.	.11	.51		T.	T.				.42		1.06
Primrose.....			.22	.60								.55		2.12
<i>Hudson Valley.....</i>	0.02	T.	0.09	0.28	0.67	0.00	0.05	0.02	T.	T.	T.	0.47	T.	1.05
Albany.....	.01	T.	.02	.06	.88		.01	.02			T.	.45		.87
Cedar Hill.....	.01		.60	.08	.86		.02	.01				.51		1.03
Honeymead Brook.				.21	1.28		T.		T.			.51		1.30
Poughkeepsie.....			T.	.28	.75		.02							2.23
<i>Wappingers Falls..</i>			.08	.12	.84		.08	.06	T.		T.	.62		1.42
Catskill.....			T.	.87			.05					.55		*
West Point.....				.10				T.	T.			.50		
Boyd's Corners.....														
Carmel.....				*	11.11			.02				.44		*
<i>Southe't Reservoir</i>														
Eagle Mills.....			.02	1.05								1.00		.70
Easton.....	.17		.21		.78		.28			T.		.21		1.10
Greenwich.....	.05		.04	T.	1.35		T.	.06			T.	.38	.03	.70
<i>Mohawk Valley....</i>	0.04	0.06	0.06	0.36	0.76	0.05	0.13	0.00	0.00	0.00	0.02	0.16	0.00	1.24
Little Falls (1a)...		.20		T.	1.74		.36				.08	.23		1.35
Canajoharie.....	.02		.09	1.24	T.		.08				T.	.10		1.00
St. Johnsville.....	.02		.10		1.29		.09				T.	.28		.73
Rome.....	.11	.02	.05	.19		.20						.03		.97
<i>Champlain Valley..</i>	0.03	0.00	0.07	0.08	0.76	0.02	0.10	0.21	0.00	0.00	T.	0.16	T.	0.70
Platts'b Barracks..					.40	.08		.25					.02	
Ticonderoga.....	.04		.12		1.24		.01	.60				.13		.43
Glens Falls.....	.07		.96	.15	.82		.22				T.	.30		1.10
Lake George.....	T.		.10	.18	.98		.19				T.	.22		1.29
<i>St. Lawrence Val'y</i>	0.12	T.	0.01	0.20	0.17	0.00	0.09	0.00	0.00	0.04	0.42	0.01	0.00	0.37
Madison Barracks..	.39		.01	.39			.17			.18	.28			*
Watertown.....														
Canton.....	.10			.13	.29		.07				.37			.47
<i>De Kalb Junction..</i>	.06	.02	.06	.08	.29						.51			.27
North Hammond...	.10	T.	T.	.20	.10		.10				.50			*
Ogdensburg.....	.05			*	1.43		.10				.40	.07		*
Potsdam.....														
<i>Great Lakes.....</i>	0.22	T.	0.03	0.15	0.15	0.06	0.12	0.01	T.	T.	0.10	0.02	0.03	0.70
Westfield.....	T.			.29	T.	.10	.23				.08	.09		.48
Buffalo.....	.26	T.	.02	.04	.07	.01	.14	T.		T.	.34	T.	T.	1.31
<i>Adams Centre.....</i>	.08		.04			.07			.01		.12		.08	.82
Pittsford.....	.09	.02		.01	.17		.15				.03			.68
Rochester.....	.32	.02	.03	.02	.14	.05	.31				.10	.01		.61
<i>Scottsville.....</i>														
Appleton.....	.10		.20	.15			.18				.18			
Fort Niagara.....	.59		.08								.18			*
Niagara Falls.....	.16		.08	.09			.16				.17	.02		1.21
<i>Baldwinsville.....</i>	.10	T.	T.	.75	.05		T.						.23	.93
Lyndonville.....														
Ridgeway.....	.10		.08	.09	.62	.01	.10				.12			1.12
Fulton.....	.20			.25	.59	.20	.05		.03	.01				.05
Oswego.....	.21	T.	.05	.27	.41	T.	.22	T.			.06	.08	T.	.51
<i>Palermo.....</i>	.93			.03	.10		.12	.08			.02	.08		.10
Phoenix.....	.25				.65	.25	.12	.02						.08
Lyons.....	.10		T.	.30	T.	.15			.03	.03	.01	T.	.08	1.06
Rose.....	.39	T.		.15	.35	.15	.22				.05	.08	.05	.59
Erie, Pennsylvania.	.04	.03	T.	.12	.05	.02	.02	T.			.24	.03	T.	.58

TATION FOR DECEMBER — (Continued).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.....	.....	T.	.....	.....	.07	.12	.02	.....	.....	.....	.20	.....	.....	.....	.13	.30	5.50
1.24	.....	.....	.....	.....	.11	.05	.06	.....	.....	.....	.27	.....	.....	.....	.07	.78	6.60
.79	.....	.....	.....	.....	.07	T.	.05	.....	.....	.....	.30	T.	.....	.....	.....	.....	4.23
.34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	1.05	5.42
0.96	T.	T.	T.	0.01	0.11	0.03	0.02	0.01	T.	0.00	0.09	T.	0.00	0.07	0.05	0.86	5.16
1.12	.....	T.	.01	.....	.18	.02	T.	.04	T.	.....	T.	.....	.....	.....	.05	.64	4.38
1.14	.....	.....	T.	.....	.09	.01	.03	.01	.....	.....	T.	T.	.....	.....	T.	.59	5.02
.62	.....	.02	T.	.....	.15	T.	T.	.....	.....	.....	.10	.....	.....	T.	.20	1.00	5.39
.43	.....	T.	.....	*	↑ .17	.04	.....	.....	.....	.....	.03	.....	.....	.....	.....	.62	4.57
.84	T.	.02	.....	.....	.10	.15	.10	.08	.....	.....	.30	.....	.....	.....	.....	1.18	5.99
†2.61	.....	.....	.....	.....	.10	.....	T.	.....	.....	.....	.10	.....	.....	.....	.30	1.40	5.98
*	†2.30	.....	.....	.....	.20	.....	.....	T.	.....	.....	.20	.....	.....	.....	.20	2.10	5.60
†1.78	.....	.....	.....	.....	.....	*	↑ .24	.04	.....	.....	.....	.....	.....	.....	.....	.....	6.56
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.22	.....	.....	.....	.30	1.07	5.22
.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.78
.89	.....	.....	.....	.....	.17	.....	.....	.04	.....	.....	.....	.....	.....	.....	.....	.25	3.87
1.41	.....	.....	.06	.....	T.	*	*	↑ .27	.....	.....	.05	T.	.....	T.	T.	.37	5.08
1.36	.....	T.	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	T.	.30	4.59
0.26	0.00	0.12	0.05	0.00	0.13	0.02	0.07	0.17	0.02	0.00	0.04	0.05	0.00	0.13	0.08	0.48	4.49
.04	.....	.14	.04	.....	.11	.....	.12	.14	.....	.....	.....	.09	.....	.14	.....	.44	5.22
.....	.....	.02	T.	.....	.12	.....	.07	.06	.....	.....	.08	T.	.....	.02	T.	.80	4.60
.93	.....	.....	.06	.....	.05	.09	.03	.12	.08	.....	.07	.....	.....	.....	.30	.41	4.65
.05	.....	.32	.10	.....	.25	.....	.09	.33	.....	.....	.....	.11	.....	.36	.03	.25	3.49
1.09	T.	0.01	0.01	0.00	0.03	0.08	0.03	T.	0.00	0.00	T.	T.	0.00	0.13	0.03	0.21	3.88
.98	.....	.....	.05	.....	.....	.15	.....	.....	.....	.....	.....	.01	.....	.....	.....	.02	1.96
1.34	.01	.....	.....	.....	.....	.08	.08	.....	.....	.....	.....	.....	.....	.10	.....	T.	4.10
.93	.....	.04	.....	.....	.08	.04	.08	T.	.....	.....	.....	.....	.....	.40	.....	.42	4.71
1.10	.....	T.	.....	.....	.05	.05	.03	T.	.....	.....	T.	T.	.....	.03	.13	.40	4.75
0.56	0.00	0.22	0.08	0.00	0.06	0.02	0.05	0.06	0.08	0.00	T.	0.00	0.00	0.07	0.16	0.05	3.00
†.82	.....	.16	.06	.....	.08	.....	*	†1.60	.40	.....	.....	.....	.....	.23	.....	.....	3.68
.....
.58	.....	.40	.....	.....	.15	.....	.10	.....	.....	.....	T.	.....	.....	.....	.30	.25	3.21
.....
.53	.....	.10	.31	.....	.01	.06	.05	.07	.....	.....	.....	.....	.....	.....	.....	.39	2.84
†1.05	.....	.06	.04	.....	.02	.....	T.	.10	.....	.....	.02	.....	.....	.12	.10	.....	2.51
†1.20	.....	.40	.....	.....	*	↑ .05	*	↑ .07	.....	.....	T.	.....	.....	.....	T.	T.	2.77
.....
0.58	0.01	0.24	0.10	0.05	0.01	0.04	0.06	0.13	0.03	0.03	T.	0.14	0.02	0.13	0.07	0.06	3.36
.59	.....	.46	.08	.09	.03	.01	.06	.05	.....	.....	.....	.....	.....	.06	.07	.....	2.71
.50	T.	.38	T.	T.	.02	.04	.08	.02	.04	T.	T.	T.	.....	.62	.20	.07	3.59
.51	.04	.03	.63	.....	.03	.....	.31	1.02	.....	.....	.01	.06	.....	.02	.....	.04	3.95
.39	.....	.17	T.	.06	.02	.03	.04	.15	T.	.....	.....	T.	.06	.10	.06	.03	2.26
.57	.....	.18	.05	.14	.03	.05	.05	.15	.07	.....	T.	.07	.07	.20	.06	.08	3.39
.....
.60	.....	.28	.04	.01	T.	T.	.04	.02	T.	.....	T.	.03	T.	.22	.13	T.	3.34
†1.46	.....	.25	.....	.....	*	↑ .05	.....	.....	*	*	*	*	*	↑ .25	.....	.....	2.77
.74	.....	.41	.....	.02	T.	T.	.05	.02	.....	.....	.....	T.	.....	.24	.19	T.	3.56
.....
.....	.01	.11	.26	T.	.10	.05	.10	.10	T.	.....	.....	.....	.20	.....	.38	T.	3.64
.....
.56	.....	.21	.01	.04	.01	T.	.03	.06	.....	.....	.....	.03	.....	.10	.....	.....	2.80
.55	.....	.55	.08	.07	.05	.05	.08	.30	.10	.....	.07	1.00	.....	.....	.40	.20	4.79
.84	.03	.13	.16	.06	.04	.03	.03	.05	.01	.20	T.	.02	.01	.06	.09	T.	3.60
1.00	.02	*	†.63	.05	.02	.03	.01	.02	.05	.....	.....	.57	.01	.20	.01	.01	4.08
.98	.09	T.	.15	.....	T.	.15	.03	.03	T.	.30	.....	.....	.15	T.	.....	.....	3.25
.10	.....	.13	.10	.10	.05	.05	.05	.10	.....	.....	T.	.30	.....	.20	T.	.20	3.14
.63	T.	.14	.03	.20	.04	.02	.02	.03	.15	T.	.....	.07	.....	.10	.05	.15	3.57
.65	.....	.42	.03	.01	.15	.09	.04	.09	.05	.....	T.	T.	T.	.05	.01	.01	2.73

DAILY AND MONTHLY PRECIP

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Central Lakes</i>	0.10	T.	0.02	0.13	0.27	0.03	0.03	T.	0.00	0.00	T.	0.03	0.01	0.34
Auburn .....	.20	.....	.....	.11	.48	.....	.07	.....	.....	.....	.....	T.	.....	.57
Fleming .....	.20	.....	.....	T.	.42	.....	T.	.....	.....	.....	.....	.....	.....	.....
Sherwood .....	.05	.....	.....	.60	.....	.....	.....	.....	.....	.....	.....	.....	.10	.90
Skaneateles.....	.15	.03	.02	.12	.63	.04	.09	.01	.....	.....	.02	.05	.....	.37
‡Watkins .....	.01	T.	T.	.09	.24	.04	.01	.....	.....	.....	T.	.09	.....	?
Romulus.....	.04	.....	.11	.....	.....	.....	.12	.....	.....	.....	.....	.....	.....	.10
Ithaca .....	.10	.....	.02	.10	.30	.03	T.	.....	.....	.....	T.	.08	.....	.24
Penn Yan.....	.01	.....	.....	.02	.08	.10	T.	.....	.....	.....	T.	.05	.....	.19
Average.....	0.08	0.01	0.05	0.24	0.42	0.02	0.08	0.03	T.	T.	0.09	0.17	0.01	0.82

‡ Record for the month incomplete. || Received too late to be included in the averages.
 lated from values at other stations.

TATION FOR DECEMBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.67	T.	0.05	0.01	0.02	0.06	0.01	0.07	0.03	0.04	T.	0.01	0.01	T.	0.05	0.06	0.34	2.43
.62	.....	.....	T.	.....	.12	.....	.10	.....	.12	.....	.....	.....	.....	.05	.....	.48	2.92
.70	.....	T.	T.	.....	T.	.....	.30	.....	.....	.....	.....	.....	.....	.....	.....	.30	1.92
.20	.....	.....	.05	.....	.....	.....	.....	.08	.06	.....	.....	.....	.....	.....	.....	.20	.31
.75	.03	.10	.02	.10	.06	.04	.05	.07	.15	.03	.....	.02	.03	.10	.05	.35	3.48
†	.....	.09	T.	.02	.09	.02	.02	.05	.....	.....	T.	T.	T.	.01	.09	.29	.....
1.18	.....	.11	.....	.02	.04	.....	.....	T.	.....	.....	.....	.....	T.	.01	.07	.21	2.01
.71	.....	.02	T.	.03	.11	.02	.05	T.	.....	.....	.05	T.	T.	.20	T.	.50	2.56
.55	.....	.05	.....	.03	.03	T.	.03	.03	T.	.....	T.	.03	.....	.03	.04	.29	1.56
0.62	T.	0.10	0.04	0.01	0.09	0.04	0.06	0.07	0.02	T.	0.06	0.02	T.	0.10	0.11	0.43	3.90

* Amount included in next measurement. † Not included in computing averages. § Interpo-

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).									
		Normal for the month of December.	Length of record, years	Record begins.	Record ends.	Mean for December, 1897.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR DECEMBER.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau.</i>		27.6	...	...	...	30.1	+2.5	...	...	...	...
Angelica.....	Allegany.....	26.1	15	1854	1897	29.6	+3.5	34.3	1889	18.8	1872
Humphrey.....	Cattaraugus..	27.9	15	1883	1897	28.6	+0.7	37.0	1889	20.3	1886
Elmira.....	Chemung.....	29.0	17	1850	1897	32.2	+3.2	38.2	1891	23.5	1851
<i>Eastern Plateau.</i>		26.7	...	...	...	28.7	+2.0	...	...	...	...
Oxford.....	Chenango.....	26.1	3	1828	1897	27.4	+1.3	34.2	1829	15.3	1831
Cortland.....	Cortland.....	26.5	35	1829	1897	28.6	+2.1	34.1	1848	20.3	38° 51' 54"
Cooperstown.....	Otsego.....	25.0	41	1854	1897	27.8	+2.8	33.6	1891	14.7	1876
Waverly.....	Tioga.....	29.1	16	1882	1897	31.0	+1.9	35.6	1891	22.3	1886
<i>Northern Plateau.</i>		23.3	...	...	...	23.7	+0.4	...	...	...	...
Lowville.....	Lewis.....	23.3	32	1827	1897	23.7	+0.4	32.3	1829	11.8	1831
<i>Atlantic Coast.</i>		34.8	...	...	...	36.4	+1.6	...	...	...	...
New York City.....	New York.....	34.2	28	1870	1897	36.0	+1.8	42.0	1891	25.2	1876
Setauket.....	Suffolk.....	35.5	13	1885	1897	36.7	+1.2	41.8	1891	30.6	1886
<i>Hudson Valley.</i>		28.7	...	...	...	29.2	+0.5	...	...	...	...
Albany.....	Albany.....	28.5	24	1874	1897	29.0	+0.5	38.6	1891	17.4	1876
Honeymead Brook.....	Dutchess.....	28.9	17	1881	1897	29.5	+0.6	35.4	1891	22.5	1886
<i>Champlain Valley.</i>		22.6	...	...	...	23.6	+1.0	...	...	...	...
Plattsburgh Barracks..	Clinton.....	22.6	42	1839	1897	23.6	+1.0	33.4	1891	11.3	1890
<i>St. Lawrence Valley.</i>		23.4	...	...	...	24.4	+0.6	...	...	...	...
Madison Barracks.....	Jefferson.....	25.5	37	1839	1897	25.4	-0.1	36.0	1891	15.4	1890
Canton.....	St. Lawrence..	22.6	35	1862	1897	22.1	-0.5	36.5	1881	9.2	1876
North Hammond.....	"	23.3	19	1866	1897	25.6	+2.3	34.2	1891	13.1	1871
Potsdam.....	"	22.2	29	1828	1896	...	...	33.9	1891	11.0	1890
<i>Great Lakes.</i>		29.1	...	...	...	29.2	+0.1	...	...	...	...
Buffalo.....	Erie.....	29.7	28	1870	1897	30.0	+0.3	37.4	1889	19.4	1876
Rochester.....	Monroe.....	29.9	28	1870	1897	30.0	+0.1	36.6	1889	19.5	1876
Fort Niagara.....	Niagara.....	29.6	42	1842	1897	31.2	+1.6	39.2	1889	22.5	1859
Baldwinsville.....	Onondaga.....	28.0	19	1854	1897	26.4	-1.6	36.6	1889	22.4	1856
Oswego.....	Oswego.....	29.2	28	1870	1897	29.0	-0.2	37.2	1882	20.4	1890
Palermo.....	"	25.0	44	1854	1897	26.3	+1.3	34.0	1891	15.7	1867
Erie, Pennsylvania....	Erie.....	32.6	24	1874	1897	32.0	-0.6	41.0	1889	22.0	1876
<i>Central Lakes.</i>		29.7	...	...	...	30.7	+1.0	...	...	...	...
Ithaca.....	Tompkins.....	29.7	19	1879	1897	30.7	+1.0	39.2	1891	22.0	1890
Average departure...		...	...	...	...	...	+1.0	...	...	...	...

AND PRECIPITATION — DECEMBER.

STATION.	COUNTY.	PRECIPITATION—(INCHES).									
		Average for the month of December.	Length of record, years.	Record begins.	Record ends.	Total for December, 1897.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR DECEMBER.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
<i>Western Plateau.</i>		2.74	...	...	...	2.76	+0.02	...	...	...	...
Angelica.....	Allegany.....	2.64	12	1856	1897	3.10	+0.46	4.02	1895	1.13	1892
Humphrey.....	Cattaraugus.....	3.09	15	1883	1897	3.59	+0.50	5.74	1893	1.62	1896
Elmira.....	Chemung.....	2.50	17	1851	1897	1.60	-0.90	4.50	1858	0.61	1896
<i>Eastern Plateau.</i>		2.75	...	...	...	4.21	+1.46	...	...	...	...
Oxford.....	Chenango.....	2.55	28	1829	1897	4.01	+1.46	4.46	1850	0.90	1895
Cortland.....	Cortland.....	2.81	20	1850	1897	3.00	+0.19	4.39	1850	1.07	1892
Copperstown.....	Otsego.....	2.73	44	1854	1897	4.64	+1.91	6.02	1881	0.97	1877
Port Jervis.....	Orange.....	3.40	13	1880	1897	6.71	+3.31	6.05	1894	1.14	1896
Waverly.....	Tioga.....	2.26	16	1882	1897	2.70	+0.44	4.34	1890	0.70	1892
<i>Northern Plateau.</i>		2.92	...	...	...	3.02	+0.10	...	...	...	...
Lowville.....	Lewis.....	2.92	34	1827	1897	3.02	+0.10	5.81	1893	0.59	1846
<i>Atlantic Coast.</i>		3.41	...	...	...	5.71	+2.30	...	...	...	...
New York City.....	New York.....	3.29	28	1870	1897	4.83	+1.54	6.66	1884	0.95	1877
Setauket.....	Suffolk.....	3.53	13	1885	1897	6.60	+3.07	6.60	1897	1.56	1892
<i>Hudson Valley.</i>		3.31	...	...	...	5.30	+1.99	...	...	...	...
Albany.....	Albany.....	2.72	24	1874	1897	4.38	+1.66	6.16	1878	0.71	1877
Honeymead Brook.	Dutchess.....	3.10	17	1881	1897	5.39	+2.29	5.39	1897	1.03	1892
Poughkeepsie.....	".....	3.14	22	1830	1897	4.57	+1.43	6.46	1847	0.95	1843
West Point.....	Orange.....	3.00	51	1840	1897	5.60	+2.60	6.25	1840	0.83	1867
Boyd's Corners.....	Putnam.....	4.00	27	1870	1897	6.16	+2.16	8.74	1878	1.11	1892
<i>Champlain Valley.</i>		1.99	...	...	...	1.96	-0.03	...	...	...	...
Plattsburgh Barracks..	Clinton.....	1.99	38	1840	1897	1.96	-0.03	7.25	1850	0.17	1886
<i>St. Lawrence Valley.</i> ...		2.28	...	...	...	3.10	+0.82	...	...	...	...
Madison Barracks.....	Jefferson.....	2.30	37	1840	1897	3.68	+1.38	6.38	1878	0.35	1874
North Hammond.....	St. Lawrence..	2.78	17	1866	1897	2.51	-0.27	6.11	1860	0.94	1874
Potsdam.....	".....	1.76	28	1838	1896	...	...	4.89	1893	0.46	1841
<i>Great Lakes.</i>		3.18	...	...	...	3.26	+0.08	...	...	...	...
Buffalo.....	Erie.....	3.42	28	1870	1897	3.59	+0.17	5.86	1881	0.84	1896
Rochester.....	Monroe.....	3.35	28	1870	1897	3.29	-0.04	6.17	1888	1.00	1874
Fort Niagara.....	Niagara.....	2.09	42	1841	1897	2.77	+0.68	4.13	1878	0.31	1845
Oswego.....	Oswego.....	3.39	27	1871	1897	3.60	+0.21	10.49	1878	1.02	1876
Palermo.....	".....	3.69	38	1860	1897	4.08	+0.39	7.95	1878	1.35	1892
Erie, Pennsylvania....	Erie.....	3.14	25	1873	1897	2.73	-0.41	6.44	1881	0.75	1876
<i>Central Lakes.</i>		2.33	...	...	...	2.56	+0.23	...	...	...	...
Ithaca.....	Tompkins.....	2.33	19	1879	1897	2.56	+0.23	4.75	1881	0.85	1892
Average departure.	.....	...	...	...	...	...	+0.94	...	...	...	...



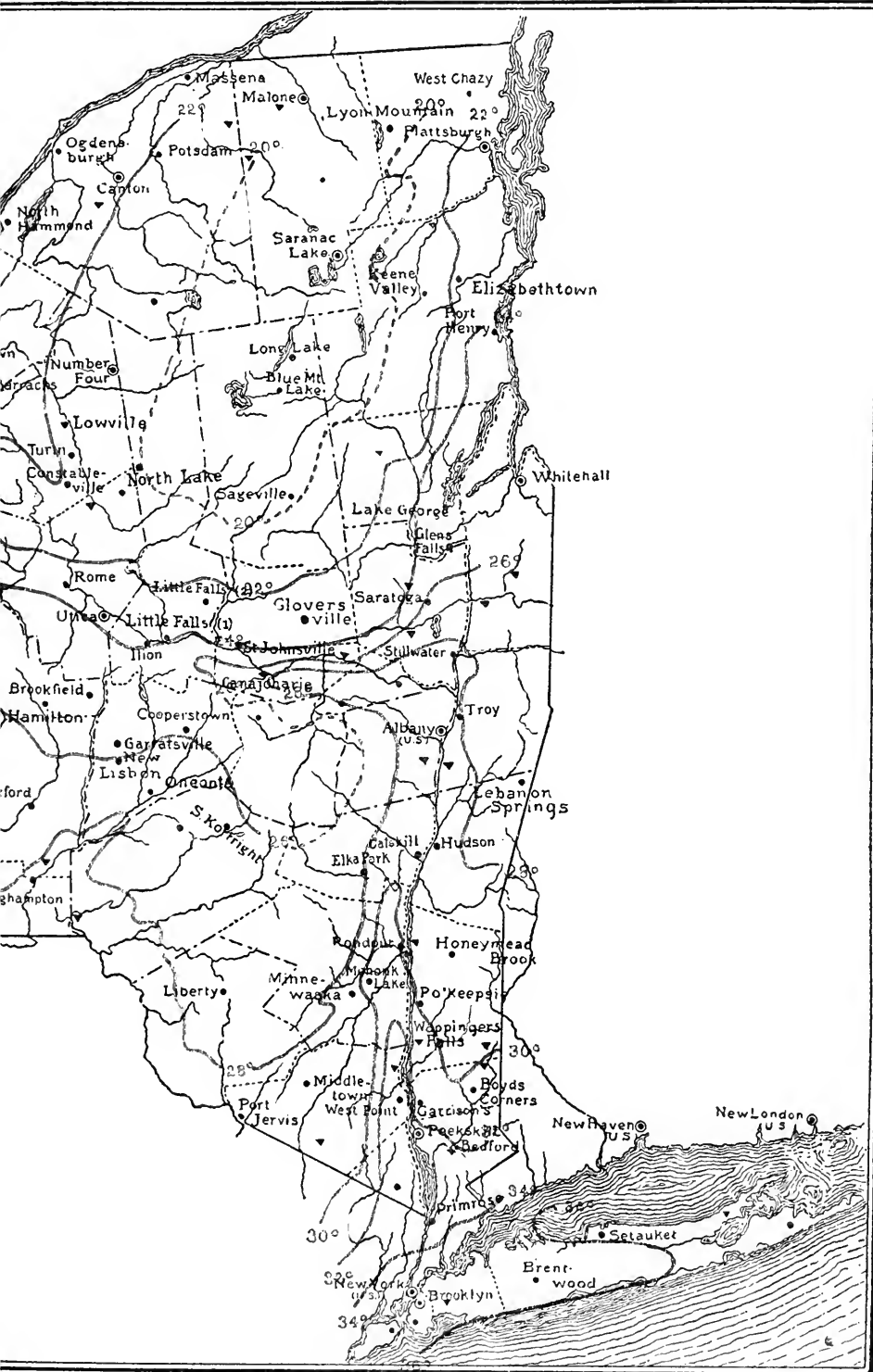
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR DECEMBER, 1897.





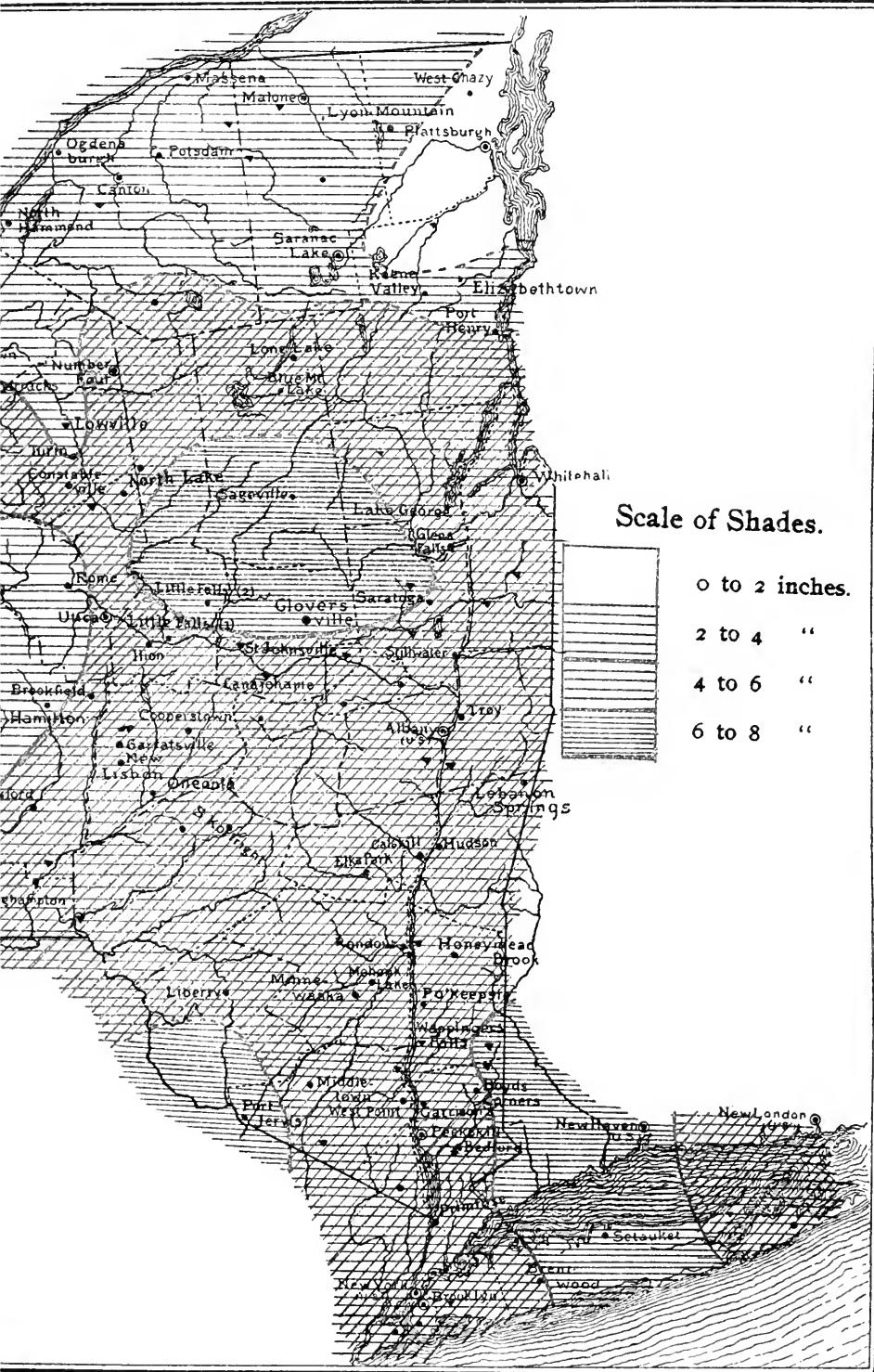
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR DECEMBER, 1897.





Meteorological Summary for the Year 1897.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during 1897 was 30.05 inches; the highest monthly mean pressure, 30.15 inches, occurring in September, and the lowest, 29.94 inches, in July. The highest barometer was 30.87 inches at Albany on March 1st, and the lowest was 29.06 inches at Oswego on November 9th, giving a range of 1.81 inches within the State. The highest local monthly mean pressure was 30.18 inches at Albany in October, the lowest being 29.92 inches at Buffalo, Rochester and Oswego in July. The greatest local range was 1.69 inches at Albany, and the least, 1.56 inches, at Buffalo and Erie. The mean annual range for all stations was 1.63 inches. The greatest departures of monthly means from the normal were +0.08 inch in April, September and October, and —0.06 inch in May.

The mean annual temperature for the State was 46.4 degrees, as derived from the records of 81 stations; the mean temperature of January, the coldest month, being 22.3 degrees, and of July, the warmest month, 72.1 degrees. The highest local annual mean was 52.6 degrees at Brooklyn, and the lowest was 40.7 degrees at North Lake, Herkimer county. The highest local monthly mean was 75.1 degrees at Canajoharie in July, and the lowest was 13.9 degrees at Saranac Lake in January. The maximum temperature reported during the year was 102 degrees at Avon on July 5th and 10th, and the minimum was 28 degrees below zero at Saranac Lake on February 28th, giving an annual range of 130 degrees within the State. The average daily range for the year was 19 degrees; the greatest local value being 25 degrees at Oxford, while the least was 12 degrees at Arkwright. The

mean annual temperature of the State, as derived from the records of 22 stations possessing records of ten years or more, was very slightly above the normal. Only Honeymead Brook and Plattsburgh Barracks reported deficiencies of temperature.

The average total precipitation over the State for the year was 40.30 inches, as derived from the records of 121 stations. The maximum local precipitation was 59.26 inches at Setauket, while the minimum was 19.85 inches at Mt. Morris. The greatest monthly average for the State was 6.88 inches in July, the least being 1.10 inches in March. The greatest local monthly precipitation was 18.18 inches at Setauket in July, and the least was 0.13 inch at Poughkeepsie in October. The total depth and distribution of precipitation over the State are shown in the fourth chart of this report, and the average daily amounts by the sixth chart. The average precipitation during 1897 at 27 stations possessing records for previous years was 1.49 inches above the normal amount. Deficiencies were reported from 12 stations, the greater number of which were located in western and central New York. The amounts exceeded any annual rainfall previously recorded at Honeymead Brook and Setauket, while at Cortland the rainfall was the least on record. The average total snowfall at 53 widely distributed stations was 59.9 inches. The heaviest snowfall, exceeding 100 inches, occurred on the highlands east of Lakes Ontario and Erie, the maximum local amount being 145 inches at North Lake. On the coast and in the central valleys the total depth ranged from 25 to 40 inches.

The average number of days on which the precipitation amounted to 0.01 inch or more was 127. The number was largest near the Great Lakes and over the Northern Plateau, and least in the southeast and near the Central Lakes.

The average number of clear days for the State was 118, of partly cloudy days 113, and of cloudy days 134, giving an average cloudiness of 53 per cent.

GENERAL FEATURES OF THE WEATHER.

The annual averages of both temperature and rainfall, for the State, were nearly normal. Early in the year extremely variable temperature conditions obtained, with a remarkably warm period during the first week of January. January 25th was the coldest day of the winter over the State. The temperature was generally above the normal from March 16th to May 21st, after which there followed a notably cold period, continuing until the end of June. From July 1st to 24th an excess of temperature obtained, with one of the most intense hot waves on record during the first week. The weather was generally cooler than usual from July 25th to October 10th, with the exception of a very hot period during the second week of September. The mean temperatures of October, November and December were above the normal, the excess being most marked from October 10th to 17th, and from December 7th to 17th. No excessively low temperatures were recorded during the year.

As regards precipitation, the most noteworthy features were the excessive rains of July in eastern New York, and the severe drouth which obtained in the western-central counties through the greater part of the year, but notably during the warm months. The total snowfall was somewhat less than usual, and generally was quickly melted, leaving the ground bare in the warmer sections.

Exceptionally fine bright weather characterized the late summer and early autumn months, but the percentage of cloud was greater than usual during much of the first half of the year, and also through November and December.

High winds prevailed through the latter half of January, during much of the month of March, and in February severe wind storms occurred on the 3d and 23d. Thunderstorms occurred with less than usual frequency during May, June and August, but in July numerous and violent electrical, wind and rainstorms occurred. A small but destructive tornado was reported near Amsterdam on August 23d. September and October were free from violent storms, and during the remainder of the year the

only notable disturbances were the general cyclonic storms of November 9th and 11th, and December 14th and 23d, both giving high winds over the State.

An earthquake shock was generally felt at northern stations on the 27th of May.

FARMING NOTES: Stock wintered well, and wheat appears not to have suffered from the lack of snow. Plowing was under way in the southern counties by March 12th, and on the 27th the ground was generally reported as free from frost, so that cultivation proceeded rapidly; and in the early part of April the season was said to be two weeks in advance of the usual stage. Fruit and forest trees budded by April 18th in warm southern valleys, and were in bloom by the 30th. Vegetation advanced rapidly early in May, but cool weather late in the month, and a drouth in the western counties, acted unfavorably. June was exceptionally cold throughout, and crops remained in a backward state until the heated term early in July. Hay was gathered in fine condition late in June. Tree fruits, excepting apples, grew finely, although insect pests were very numerous. The strawberry crop was good and very large in the southeast. There was little damage from frost during the growing season.

Corn and other belated crops developed rapidly in July, excepting in some western-central and southeastern sections, where drouth continued. The wheat and rye harvests were well under way by the 12th, and in the south oats were ready for cutting by the 31st. Much damage resulted from excessive rain in eastern and northern New York. Cloudy and rainy weather prevailed in these sections also during much of August, retarding corn and buckwheat, while in the west the drouth continued. Fruits, other than apples, still maintained a fine condition; tobacco was gathered in good order, and the results of grain threshing were generally satisfactory; but potatoes blighted badly. The bright, hot weather of the first half of September ripened corn and buckwheat rapidly, and harvesting was general by the 20th. Severe drouth in the west during September and

October injured these crops. Fall seeding often failed to germinate, and in many cases the ground was too dry for plowing. Foliage took on unusually brilliant tints between October 1st and 10th. Severe frosts came very late this autumn, and in the south and near large bodies of water vegetation was uninjured until November.

ICE IN RIVERS, ETC.: Navigation opened on the Hudson, as far north as Poughkeepsie, on the 2d of March, and the first boat reached Albany from New York on the 16th. Ice broke up in the Susquehanna river on the 4th, in Chautauqua lake on the 12th and in Lake George on April 13th. The rivers of central and southern New York were generally closed by ice (temporarily) between the 25th and 31st of December.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						TEMPERA		
STATION.	COUNTY.	Elevation, feet.	Annual mean.	Highest monthly mean.	Month.	Lowest monthly mean.	Month.	Annual range.	Annual mean.	Highest monthly mean.	Month.
<i>Western Plateau.</i>											
Alfred	Allegany	1792							46.4	71.2	July
Angelica	"	1340							45.3	70.7	July
Bolivar	"	1800							45.0	69.3	July
Friendship	"	1550								69.6	July
<i>Franklinville</i>											
Humphrey	Cattaraugus	1593							45.1	70.4	July
Arkwright	"	1950							45.8	69.5	July
Jamestown	Chautauqua	1260							46.2	70.3	July
	"	1324							47.2	71.8	July
<i>Elmira</i>											
Avon	Chemung	863							49.4	74.4	July
Mt Morris	Livingston	585							47.4	74.3	July
Lockport	"	525									
	Niagara	650							48.4	74.6	July
<i>Wedgewood</i>											
Addison	Schuyler	1350							47.1	72.8	July
South Canistoe	Steuben	1000							47.5	71.5	July
Arcade	"	1489							45.3	69.2	July
	Wyoming	1707							44.8	70.5	July
<i>Eastern Plateau.</i>											
Binghamton (1)	Broome	870							46.1	71.0	July
Binghamton (2)	"	875							47.0	71.8	July
Oxford	Chenango								47.1	72.0	July
Cortland	"								45.6	71.0	July
	Cortland	1120							45.9	70.8	July
<i>South Kortright</i>											
Bonckville	Delaware	1700							43.9	65.6	July
Middletown	Madison	1350									
Port Jervis	Orange	700								73.2	July
Cooperstown	"	470							48.6	72.1	July
	Otsego	1250							44.4	70.5	July
<i>Garrattsville</i>											
New Lisbon	Otsego								44.5	69.0	July
Oneonta	"	1234							45.2	68.8	July
Perry City	"	1100							47.4	72.4	July
	Schuyler	1038							45.2	71.4	July
<i>Strait's Corners</i>											
Waverly	Tioga								46.1	72.0	July
Dryden	"	824							48.1	72.6	July
Mohauk Lake	Tompkins	1079								71.8	July
	Ulster	1245							47.3	70.6	July
<i>Northern Plateau.</i>											
Lake Placid									42.3	69.2	July
Saranac Lake	Essex	1900									
Gloversville	Franklin								41.4	70.0	July
	Fulton	850							44.4	70.7	July
<i>Little Falls (2a)</i>											
North Lake	Herkimer	1526							42.9	69.4	July
Lowville	"								40.7	67.6	July
Number Four	Lewis	900							43.4	70.6	July
	"	1571	30.05	30.15	Sept.	29.95	June	1.61	41.1	68.0	July
<i>Atlantic Coast.</i>											
Brooklyn	Kings								50.9	72.6	July
Manhattan Beach	"								52.6	74.4	July
										70.9	July
<i>New York city</i>											
Willets Point	New York	314	30.06	30.16	Oct.	29.96	a	1.57	51.6	73.0	July
Brentwood	Queens								51.2	73.6	July
	Suffolk	80								72.0	July
<i>Setauket</i>											
Bedford	Suffolk	40							51.5	72.4	July
Primrose	Westchester	290							49.4	71.6	July
	"	200							50.5	74.1	July

FOR THE YEAR 1897.

TUBE — (IN DEGREES FAHR.).						SKY.			PRECIPITATION — (INCHES).						
Lowest monthly mean.	Month.	Maximum.	Minimum.	Annual range.	Mean daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total for the year.	Greatest monthly.	Month.	Least monthly.	Month.	Total snowfall.
21.9	Jan...	102	-21	123	20	121	106	138	132	32.58	5.10	July..	0.89	Oct....	.....
93	Jan...	93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19.2	Jan...	95	-20	115	21	.....	.....	.....	140	37.15	5.56	June..	0.65	Oct...	58.5
19.8	Jan...	95	-16	111	24	84	123	158	140	35.93	6.36	July..	0.70	Oct...	48.0
20.6	Jan...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19.6	Jan...	96	-21	117	21	113	80	172	186	34.63	5.88	July..	0.75	Oct...	76.7
21.6	Jan...	90	-3	93	23	63	130	172	162	37.47	7.77	July..	0.60	Oct...	95.6
23.2	Jan...	88	1	87	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22.4	Jan...	95	-7	102	18	62	191	112	143	42.48	5.93	July..	0.69	Oct...	108.5
24.7	Jan...	98	-1	99	20	207	6	152	83	30.13	5.56	May..	0.65	Oct....	.....
23.4	Jan...	102	-10	112	22	.....	.....	.....	83	20.38	4.08	July..	0.64	Feb....	.....
.....	Jan...	99	.....	.....	.....	153	91	121	64	19.85	2.70	Mar..	0.20	Aug..	30.0
25.8	Jan...	99	-2	101	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21.5	Jan...	98	-3	101	21	89	190	86	133	29.34	3.43	July..	0.74	Oct...	40.2
24.0	Jan...	95	-7	102	21	188	76	101	149	29.24	4.52	July..	0.76	Feb....	26.3
20.2	Jan...	95	-9	104	.....	150	52	163	128	35.83	5.62	July..	1.04	Oct...	57.0
20.1	Jan...	95	-7	102	20	89	119	147	167	39.15	8.35	July..	0.97	Oct...	68.6
22.8	Jan...	98	-13	111	21	124	117	124	126	38.65	6.07	July..	0.79	Oct...	.....
23.7	Jan...	96	-19	106	20	96	136	133	132	33.12	4.88	May..	0.82	Oct...	47.0
24.0	Jan...	95	-6	101	20	96	128	141	147	27.08	4.61	May..	0.66	Oct....	.....
22.6	Jan...	98	-7	105	25	83	155	127	139	43.47	8.04	July..	0.80	Oct...	60.6
21.4	Jan...	94	-6	100	20	181	86	98	125	30.98	4.46	July..	0.68	April..	.....
21.7	Jan...	98	-13	111	24	.....	.....	.....	78	43.91	6.03	Aug..	0.94	Jan...	.....
25.1	Jan...	93	-3	96	19	181	106	78	121	49.27	9.23	July..	1.18	Oct...	42.0
21.6	Jan...	91	-10	101	16	139	113	113	129	46.52	6.60	Aug..	0.64	Oct...	65.5
22.5	Jan...	90	-10	100	20	159	91	115	96	41.78	7.30	May..	0.59	Oct...	54.9
20.3	Jan...	94	-13	107	21	104	94	167	134	37.61	5.58	July..	0.73	Oct...	66.0
26.2	Jan...	97	-4	101	23	.....	.....	.....	102	46.47	7.42	May..	0.46	Oct....	.....
21.0	Jan...	97	-13	110	22	90	128	147	151	32.12	4.18	June..	0.86	Oct...	45.6
22.2	Jan...	97	-4	101	21	.....	.....	.....	133	33.36	4.27	May..	0.52	Oct...	43.3
24.2	Jan...	98	-9	107	23	108	138	119	146	33.57	4.50	July..	0.79	Oct...	31.6
.....	Jan...	96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23.4	Jan...	89	0	89	.....	.....	.....	.....	.....	49.55	14.71	July..	1.06	Oct...	.....
17.7	Jan...	95	-28	123	21	98	121	146	150	49.26	7.36	July..	1.70	Oct...	.....
13.9	Jan...	95	-28	123	23	103	129	133	154	39.86	8.55	July..	1.41	Oct...	85.0
20.2	Jan...	93	-11	104	20	120	86	159	166	55.14	9.80	July..	1.59	Oct...	85.0
19.6	Jan...	93	-19	112	20	.....	.....	.....	161	49.65	6.78	Nov...	1.45	Oct...	114.8
17.8	Jan...	91	-25	116	21	.....	.....	.....	113	57.25	10.24	Nov...	2.08	Oct...	145.5
18.4	Jan...	95	-25	120	21	85	179	101	164	35.90	5.81	Nov...	1.34	Oct...	89.0
17.2	Jan...	90	-26	116	19	83	91	191	140	51.05	6.46	July..	2.38	Oct...	128.0
28.6	Jan...	96	-6	102	17	129	121	115	125	50.37	11.20	July..	1.48	Oct...	.....
28.4	Jan...	93	6	99	15	134	88	143	133	50.88	11.60	July..	1.69	Oct...	38.7
27.6	Jan...	90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29.0	Jan...	91	5	86	14	130	108	127	135	44.27	9.52	July..	0.72	Oct...	25.6
24.8	Jan...	96	7	89	18	.....	.....	.....	111	47.80	9.75	July..	0.70	Oct...	24.1
28.2	Jan...	93	0	93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38.0
30.2	Jan...	88	9	79	14	136	116	113	.....	59.26	18.18	July..	1.20	Sept..	37.0
27.8	Jan...	92	-4	96	20	143	122	100	141	55.87	11.42	July..	2.03	Oct...	48.4
28.4	Jan...	96	-6	102	20	102	172	91	104	49.59	11.12	July..	1.84	Sept..	36.3

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						TEMPER.		
STATION.	COUNTY.	Elevation, feet.	Annual mean.	Highest monthly mean.	Month.	Lowest monthly mean.	Month.	Annual range.	Annual mean.	Highest monthly mean.	Month.
<i>Hudson Valley</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Albany	Albany	97	30.07	30.18	Oct.	29.95	June	1.69	48.5	73.6	July
Lebanon Springs	Columbia .....	.....	.....	.....	.....	.....	.....	.....	48.9	75.0	July
Honeyead Brook	Dutchess	450 .....	.....	.....	.....	.....	.....	.....	46.9	71.6	July
Poughkeepsie	Dutchess	150 .....	.....	.....	.....	.....	.....	.....	48.4	73.0	July
Wappingers Falls	"	156 .....	.....	.....	.....	.....	.....	.....	49.7	74.8	July
Cat-skill	Greene	450 .....	.....	.....	.....	.....	.....	.....	48.8	73.3	July
West Point	Orange	167 .....	.....	.....	.....	.....	.....	.....	49.4	74.4	July
Carmel	Putnam	500 .....	.....	.....	.....	.....	.....	.....	49.1	73.3	July
Greenwich	Washington .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Mohawk Valley</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	45.3	72.3	July
Little Falls (n)	Herkimer	924 .....	.....	.....	.....	.....	.....	.....	43.9	71.2	July
Cacajoharie	Montgomery	500 .....	.....	.....	.....	.....	.....	.....	47.5	75.1	July
St. Johnsville	"	810 .....	.....	.....	.....	.....	.....	.....	45.	70.8	July
Rene	Oneida	445 .....	.....	.....	.....	.....	.....	.....	41.5	72.0	July
<i>Champlain Valley</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	44.8	71.6	July
Plattsburgh Barracks	Canton	125 .....	.....	.....	.....	.....	.....	.....	43.2	70.8	July
Ticonderoga	Essex .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Glens Falls	Warren	340 .....	.....	.....	.....	.....	.....	.....	45.2	73.1	July
Lake George	"	359 .....	.....	.....	.....	.....	.....	.....	45.4	70.9	July
<i>St. Lawrence Valley</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	44.4	72.8	July
Madison Barracks	Jefferson	265 .....	.....	.....	.....	.....	.....	.....	.....	74.2	July
Watertown	"	485 .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canton	St. Lawrence	394 .....	.....	.....	.....	.....	.....	.....	.....	72.8	July
North Hammond	St. Lawrence	300 .....	.....	.....	.....	.....	.....	.....	45.4	73.4	July
Ogdensburg	"	258 .....	.....	.....	.....	.....	.....	.....	44.7	72.2	July
Potsdam	"	300 .....	.....	.....	.....	.....	.....	.....	43.0	71.4	July
<i>Great Lakes</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	47.6	73.3	July
Westfield	Chautauqua	758 .....	.....	.....	.....	.....	.....	.....	48.6	73.7	July
Buffalo	Erie	768	30.04	30.16	Sept.	29.92	July	1.56	48.0	74.0	July
Pittsford	Monroe	502 .....	.....	.....	.....	.....	.....	.....	47.4	72.7	July
Rochester	Monroe	523	30.04	30.15	Sept.	29.92	July	1.64	48.2	74.0	July
Appleton	Niagara	301 .....	.....	.....	.....	.....	.....	.....	47.2	72.5	July
Fort Niagara	"	263 .....	.....	.....	.....	.....	.....	.....	.....	74.0	July
Baldwinsville	Onondaga	390 .....	.....	.....	.....	.....	.....	.....	47.5	74.4	July
Ridgeway	Orleans .....	.....	.....	.....	.....	.....	.....	.....	.....	73.2	July
Oswego	Oswego	335	30.03	30.14	Sept.	29.92	July	1.72	46.4	72.0	July
Palermo	Oswego	460 .....	.....	.....	.....	.....	.....	.....	45.2	71.6	July
Lyons	Wayne	407 .....	.....	.....	.....	.....	.....	.....	48.4	74.1	July
Erie, Pa.	Erie	714	30.05	30.17	Sept.	29.93	July	1.56	48.6	73.0	July
<i>Central Lakes</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	48.0	73.2	July
Auburn	Cayuga .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fleming	"	1000 .....	.....	.....	.....	.....	.....	.....	48.0	73.4	July
Watkins	Schuyler .....	.....	.....	.....	.....	.....	.....	.....	.....	73.2	July
Romulus	Seneca	719 .....	.....	.....	.....	.....	.....	.....	48.6	74.0	July
Ithaca	Tompkins	810	30.04	30.15	Sept.	29.93	July	1.67	47.5	72.4	July
Peun Yan	Yates .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means .....	.....	.....	30.05	30.15	Sept.	29.94	July	1.63	46.4	72.1	July

(a) May and June.

Note.—The annual mean temperatures and average total precipitation, also the extremes for table.

* Location of station changed Dec. 1st, elevation 354 feet.

FOR THE YEAR 1897 — (*Concluded*).

TEMPERATURE—(IN DEGREES FAHR.)					SKY.				PRECIPITATION—(INCHES).						
Lowest monthly mean.	Month.	Maximum.	Minimum.	Annual range.	Mean daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which .01 or more inches fell.	Total for the year.	Greatest monthly.	Month.	Least monthly.	Month.	Total snowfall.
25.1	Jan...	99	-13	112	19	124	110	131	119	40.15	10.35	July...	1.11	Oct...	.....
25.0	Jan...	96	-5	101	18	109	118	138	144	40.79	6.67	July...	1.01	Oct...	.....
22.6	Jan...	92	-4	96	19	93	124	148	130	51.83	14.55	July...	0.33	Oct...	44.8
25.0	Jan...	96	-11	107	23	133	103	129	104	40.35	9.37	July...	0.13	Oct...	35.0
26.0	Jan...	99	-13	112	20	137	126	102	143	53.75	11.84	July...	1.24	Oct...	56.7
25.6	Jan...	95	-4	99	17	79	157	129	91	52.16	9.82	July...	0.81	Oct...	54.5
26.2	Jan...	96	-1	97	20	.....	.....	.....	101	54.23	13.05	July...	1.43	Oct...	.....
23.7	Jan...	93	-2	95	19	192	30	143	118	57.40	16.64	July...	0.89	Oct...	44.6
20.2	Jan...	99	-12	111	18	173	50	142	135	38.70	5.19	July...	0.84	Oct...	.....
18.4	Jan...	91	-32	106	18	171	40	154	131	41.94	5.45	June...	1.00	Jan...	80.8
23.0	Jan...	99	-7	106	17	208	20	137	109	37.5	6.48	July...	0.69	Jan...	50.0
20.0	Jan...	91	-9	100	17	141	89	135	153	34.27	4.67	July...	0.93	Oct...	37.5
19.2	Jan...	97	-9	106	20	.....	.....	.....	146	42.09	6.25	Nov...	0.38	Oct...	.....
19.7	Jan...	95	-18	113	19	119	106	140	129	46.23	8.28	July...	1.41	Sept...	.....
16.6	Jan...	95	-18	113	18	.....	.....	.....	115	35.73	7.19	July...	0.52	Oct...	.....
20.6	Jan...	94	-10	104	20	.....	.....	.....	122	33.86	10.02	Nov...	1.19	Sept...	70.1
21.7	Jan...	92	-14	106	20	119	106	140	149	50.28	8.83	July...	1.23	Sept...	70.8
19.2	Jan...	100	-26	126	19	94	145	126	115	32.24	5.16	July...	0.80	Oct...	.....
19.4	Jan...	99	-21	120	.....	.....	.....	.....	102	24.05	3.99	May...	0.79	Sept...	79.9
20.4	Jan...	98	-21	119	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20.1	Jan...	100	-24	124	18	43	180	142	133	32.56	4.82	Mar...	0.78	Oct...	60.4
19.7	Jan...	95	-26	121	19	111	149	105	111	30.89	4.62	July...	0.56	Sept...	56.9
16.6	Jan...	94	-24	118	20	127	107	131	.....	34.72	7.04	July...	0.55	Oct...	.....
23.9	Jan...	93	-9	108	16	105	105	155	142	34.06	6.09	July...	0.83	Sept...	.....
24.8	Jan...	94	0	94	17	157	53	155	86	35.09	8.21	July...	0.58	Sept...	.....
25.0	Jan...	95	0	95	14	95	135	165	155	37.72	8.29	July...	0.3	Sept...	.....
24.0	Jan...	98	-1	99	19	87	107	171	145	30.36	6.37	July...	0.97	Oct...	.....
24.0	Jan...	99	1	100	17	92	114	159	181	30.42	6.37	July...	0.46	Sept...	75.6
24.8	Jan...	98	-7	105	17	91	102	172	144	29.26	5.08	July...	0.28	Sept...	40.2
26.0	Jan...	95	-1	96	.....	.....	.....	.....	92	30.33	7.01	July...	0.96	Jan...	.....
22.4	Jan...	98	-3	101	19	.....	.....	.....	127	38.27	5.95	July...	0.65	Oct...	75.0
23.0	Jan...	94	-1	95	14	101	82	182	174	29.30	5.51	July...	0.47	Sept...	.....
20.6	Jan...	95	-9	104	18	158	87	120	163	39.18	8.17	July...	0.40	Oct...	136.0
21.8	Jan...	96	0	96	16	98	159	108	159	27.04	5.04	July...	0.48	Oct...	45.0
24.0	Jan...	94	-5	99	14	98	101	166	138	31.35	5.81	July...	0.54	Sept...	.....
24.0	Jan...	97	-6	103	18	96	145	124	101	31.57	3.95	July...	1.01	Oct...	.....
24.0	Jan...	95	0	95	17	53	217	95	68	29.07	3.96	June...	0.80	Oct...	38.0
24.8	Jan...	97	-2	99	19	139	81	145	100	31.89	4.80	May...	0.78	Aug...	26.2
23.7	Jan...	94	-6	100	17	97	136	132	136	33.67	4.72	Sept...	0.88	Oct...	36.0
22.3	Jan...	102	-28	130	19	118	113	134	127	40.30	6.88	July...	1.10	Oct...	59.9

the regions and for the State, are derived from the monthly values as shown in the succeeding

MONTHLY AND ANNUAL TEMPERATURE

LOCATION OF STATIONS.		TEMPERATURE —							
STATION.	COUNTY.	January.	February.	March.	April.	May.	June.	July.	August.
<i>Western Plateau</i>		21.9	26.6	34.3	44.8	54.1	60.5	71.2	64.2
Alfred	Allegany	19.5	24.7	33.0	43.0	52.5	58.4	69.2	62.0
Angelica	"	19.2	24.7	33.0	43.4	52.5	59.1	70.7	62.6
Bolivar	"	19.8	25.7	34.2	43.6	52.8	59.0	69.3	61.2
Friendship	"	20.6	26.8	35.6	45.3	53.9	60.3	69.6	.....
Franklinville	Cattaraugus	19.6	24.3	33.1	44.0	52.8	58.9	70.4	62.6
Humphrey	"	21.6	26.8	34.1	43.6	53.6	59.4	69.5	62.8
Napoli	"	.....	.....	.....	.....	.....	.....	.....	.....
Arkwright	Chautauqua	23.2	26.4	33.0	43.6	53.0	60.2	70.3	63.2
Cherry Creek	Chautauqua	.....	.....	.....	.....	.....	.....	.....	.....
Jamestown	"	22.4	28.2	36.2	45.7	54.4	61.8	71.8	64.1
Elmira	Chemung	24.7	28.8	36.5	48.3	58.6	65.2	74.4	67.6
Pine City	"	.....	.....	.....	.....	.....	.....	.....	.....
Akron	Erie	.....	.....	.....	.....	.....	.....	.....	.....
Avon	Livingston	23.4	26.0	34.6	45.4	54.7	62.1	74.3	65.7
Mt. Morris	"	.....	.....	.....	.....	.....	.....	.....	68.3
Nunda	"	.....	.....	.....	.....	.....	.....	.....	.....
Lockport	Niagara	25.8	28.8	35.3	46.4	57.0	61.6	74.6	65.8
Tyrone	Schuyler	.....	.....	.....	.....	.....	.....	.....	.....
Wedgewood	"	21.5	26.4	33.6	44.9	54.8	61.9	72.8	67.6
Addison	Steuben	24.0	27.9	36.1	46.2	55.5	61.0	71.5	64.6
Atlanta	Steuben	.....	.....	.....	.....	.....	.....	.....	.....
Haskinville	"	.....	.....	.....	.....	.....	.....	.....	.....
South Canisteo	"	21.2	26.8	34.8	44.5	53.5	58.7	69.2	62.4
Arcade	Wyoming	20.1	24.4	32.0	43.0	52.2	59.2	70.5	62.0
<i>Eastern Plateau</i>		22.8	25.0	33.2	45.1	55.0	60.5	71.0	65.0
Binghamton (1)	Broome	23.7	25.9	34.4	45.9	55.5	61.0	71.8	66.0
Binghamton (2)	"	24.0	26.0	35.0	46.0	55.0	61.0	72.0	66.0
Chenango Forks	"	.....	.....	.....	.....	.....	.....	.....	.....
Oxford	Chenango	22.6	26.2	31.4	44.4	55.0	60.6	71.0	64.8
Cortland	Cortland	21.4	25.0	33.8	43.2	54.1	59.8	70.8	64.2
South Kortright	Delaware	21.7	23.2	31.7	42.8	53.6	58.6	65.6	62.4
Bouckville	Madison	.....	.....	.....	.....	.....	.....	.....	63.8
Fayetteville	Onondaga	.....	.....	.....	.....	.....	.....	.....	.....
Middletown	Orange	.....	.....	.....	49.8	58.0	.....	73.2	67.5
Port Jervis	"	23.1	28.1	36.0	49.5	58.2	63.8	72.1	67.4
Warwick	Orange	.....	.....	.....	.....	.....	.....	.....	.....
Cooperstown	Otsego	21.6	21.3	30.3	43.2	53.6	59.5	70.5	63.8
Garrattsville	"	22.5	24.3	31.9	44.0	52.6	58.0	69.0	63.2
New Lisbon	Otsego	20.3	21.8	29.9	42.3	52.0	57.2	68.8	62.2
Oneonta	"	26.2	27.3	35.0	46.4	56.2	61.7	72.4	66.0
Schenectady	"	.....	.....	.....	.....	.....	.....	.....	.....
Perry City	Schuyler	21.0	23.6	32.6	43.2	54.2	60.0	71.4	63.6
Newark Valley	Tioga	.....	.....	.....	.....	.....	.....	.....	.....
Straits Corners	"	22.2	23.3	33.4	44.2	54.4	60.2	72.0	66.4
Waverly	Tioga	24.2	27.7	36.4	46.9	56.0	62.0	72.6	66.0
Dryden	Tompkins	.....	24.6	33.1	44.2	54.0	60.6	71.8	64.8
Mohouk Lake	Ulster	23.4	26.2	32.4	45.0	56.8	63.4	70.6	67.2
<i>Northern Plateau</i>		17.7	20.1	28.0	41.4	52.1	58.1	69.2	61.9
Elizabethtown	Essex	.....	.....	.....	42.2	.....	.....	67.8	.....
Lake Placid	"	.....	.....	.....	.....	.....	.....	.....	61.0
Saranac Lake	Franklin	13.9	17.5	27.8	41.5	52.9	58.4	70.0	62.0
Gloversville	Fulton	20.2	23.0	29.8	44.0	54.8	60.1	70.7	64.2

AND PRECIPITATION, 1897.

(DEGREES FAHR.).					PRECIPITATION — (INCHES).												
September.	October.	November.	December.	Annual mean.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual total.
60.1	51.3	38.5	29.7	46.4	2.31	1.55	2.93	2.50	3.31	2.64	5.10	2.47	1.95	0.89	3.92	3.01	32.58
59.7	50.1	.....	.....	.....	3.33	1.67	3.24	2.69	3.35	2.97	5.47	1.78	2.88	1.02	.....	.....	.....
59.3	51.0	38.7	29.6	45.3	3.12	1.57	4.21	3.15	4.07	5.56	5.14	1.77	1.74	0.65	3.07	3.10	37.15
57.4	49.2	38.0	29.7	45.0	2.31	1.44	3.37	2.48	2.80	3.44	6.36	3.26	2.06	0.70	4.69	3.02	35.93
.....	.....	.....	.....	.....	2.29	1.56	3.59	2.77	2.65	2.93	4.47	.....	.....	.....	.....	.....	.....
59.0	50.4	37.6	28.1	45.1	2.54	2.01	3.04	2.76	3.40	1.71	5.88	2.63	0.90	0.75	5.00	4.01	34.63
60.6	52.4	37.1	28.6	45.8	3.06	2.56	2.19	1.89	3.84	3.71	7.77	2.68	1.25	0.60	4.83	3.59	37.47
61.1	52.8	38.2	28.8	46.2	.....	.....	.....	.....	.....	.....	.....	.....	0.52	.....	4.95	4.39	.....
.....	.....	.....	.....	.....	4.06	2.89	4.58	3.11	4.02	3.10	6.23	4.06	1.11	2.28	6.41	5.30	47.15
60.9	51.2	39.2	30.2	47.2	4.29	2.25	5.52	3.77	3.45	2.06	5.93	2.95	0.75	0.69	6.52	4.32	42.48
62.7	53.6	40.6	32.2	49.4	1.40	0.93	2.41	2.30	5.56	1.76	3.23	3.70	3.70	0.65	2.89	1.60	30.13
.....	.....	.....	.....	.....	1.32	0.78	2.30	2.95	4.55	2.28	5.10	4.00	3.48	0.91	3.53	2.04	33.24
.....	.....	.....	.....	.....	2.48	2.50	2.89	1.79	2.82	1.79	4.03	1.73	0.62	1.34	5.09	4.20	31.28
60.2	51.8	40.4	30.6	47.4	1.97	0.64	1.87	1.21	1.75	1.96	4.08	0.90	1.42	0.72	2.19	1.65	20.36
.....	.....	.....	.....	.....	1.40	1.00	2.70	2.10	2.55	2.10	2.20	0.20	1.00	0.60	2.20	1.80	19.85
.....
61.3	51.8	39.0	33.2	48.4	1.87	2.70	2.34	1.98	2.30	1.53	3.30	2.29	0.90	0.81	4.46	.....	.....
63.8	52.4	36.9	28.1	47.1	1.85	0.87	2.54	2.72	3.72	2.74	3.43	3.04	2.66	0.74	3.20	1.93	29.44
60.0	51.3	40.3	31.1	47.5	1.54	0.76	2.29	2.41	4.26	2.56	4.52	2.05	2.90	0.94	3.10	1.91	29.24
.....	.....	.....	.....	.....	1.72	0.83	2.18	1.92	2.91	2.23	7.47	2.20	2.34	1.18	2.81	3.01	30.80
.....	.....	.....	.....	.....	1.56	0.63	2.46	2.25	3.06	1.88	5.56	1.89	2.73	0.68	2.90	2.10	27.70
*56.2	49.5	37.9	29.1	45.3	2.34	1.60	3.01	3.13	3.18	3.48	5.62	2.69	3.47	1.04	3.56	2.71	35.83
59.2	50.6	36.9	27.5	44.8	2.70	1.76	2.80	3.06	4.30	2.64	8.35	3.62	1.13	0.97	4.35	3.47	39.15
59.3	50.3	37.4	28.5	46.1	1.70	1.76	2.83	2.77	4.63	3.66	6.07	3.13	3.16	0.79	4.29	3.86	38.65
60.1	51.0	38.1	30.1	47.0	1.45	2.09	2.92	2.33	4.88	3.76	2.54	1.84	3.57	0.82	2.89	4.03	33.12
60.0	51.0	39.0	30.0	47.1	1.11	2.67	1.98	4.01	2.93	3.62	2.30	1.37	3.02	0.66	2.42	3.23	27.08
.....	.....	.....	.....	.....	.....	.....	.....	3.60	2.90	.....	4.85	2.30	2.45	1.00	2.90	.....	.....
58.4	48.8	36.0	27.4	45.6	1.76	2.09	4.08	3.76	5.47	4.80	8.04	2.68	3.13	0.80	4.85	4.01	45.47
59.2	52.4	38.2	28.6	45.9	2.68	1.11	1.55	0.68	4.23	3.81	4.46	2.07	3.13	0.71	3.55	3.00	30.98
56.0	48.2	35.4	27.4	43.9	0.94	1.53	2.59	2.91	5.33	5.00	5.56	6.03	4.67	0.98	4.35	4.02	43.91
58.4	50.8	35.4	25.6	.....	.....	.....	.....	.....	.....	.....	.....	1.93	3.01	0.68	4.34	3.43	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.47	0.42	5.02	2.54	.....
61.6	52.6	40.0	29.8	.....	.....	.....	.....	2.92	.....	.....	9.14	3.85	2.86	0.73	5.05	5.71	.....
62.2	51.3	39.5	29.9	48.6	2.91	3.00	2.74	3.11	5.57	3.24	9.23	3.65	2.22	1.18	5.71	6.71	49.27
.....	.....	.....	.....	.....	1.13	2.21	1.96	3.24	4.13	3.38	11.10	2.99	2.24	1.63	4.07	4.15	42.23
57.5	48.5	35.2	27.8	44.4	1.72	2.06	3.31	3.65	5.21	5.22	4.86	6.60	3.40	0.64	5.21	4.64	46.52
56.8	49.2	35.8	26.6	44.5	3.15	1.43	2.38	3.15	7.30	2.44	6.21	4.31	3.14	0.59	5.23	2.45	41.78
56.0	47.4	31.3	26.2	43.2	1.14	1.53	2.90	2.63	4.40	4.10	5.58	3.17	3.19	0.73	4.04	4.20	37.61
59.4	50.2	38.0	30.6	47.4	1.22	2.09	3.50	3.26	7.42	5.31	6.61	2.43	3.84	0.46	5.03	5.30	46.47
.....	.....	.....	.....	.....	.....	.....	.....	.....	1.73	.....	5.35	2.40	3.01	0.73	5.58	.....	.....
58.6	49.4	37.4	27.6	45.2	1.81	1.33	2.66	2.56	3.69	4.18	3.55	2.30	2.58	0.86	3.74	2.86	32.12
61.4	49.9	37.3	28.4	46.1	1.25	1.34	2.74	3.08	4.01	3.81	4.43	3.71	4.71	0.36	3.82	2.85	36.11
.....	.....	.....	.....	.....	1.31	2.39	2.82	2.68	4.27	3.64	4.04	2.66	4.01	0.52	3.90	2.12	33.36
61.9	51.8	39.4	31.0	48.1	1.72	1.67	1.89	3.10	3.66	3.22	4.50	3.21	3.42	0.79	3.69	2.70	33.57
58.6	48.8	37.8	29.3	.....	.....	0.59	3.37	2.82	3.96	3.76	4.30	2.22	4.45	1.00	.....	.....	.....
62.0	*52.8	39.4	28.6	47.3	1.89	3.02	4.00	2.12	3.92	2.29	14.71	4.11	1.89	1.06	5.10	5.44	49.55
56.3	47.7	32.7	22.4	42.3	2.93	1.99	4.88	3.72	4.41	4.97	7.36	3.47	2.25	1.70	6.99	4.59	49.26
.....	.....	.....	.....	.....	.....	.....	.....	4.75	2.89	.....	13.00	.....	.....	.....	.....	.....	.....
57.5	47.3	.....	23.1	.....	.....	.....	.....	.....	.....	.....	.....	1.28	2.35	1.88	.....	1.90	.....
55.6	47.2	30.1	19.8	41.4	2.48	1.50	2.70	3.79	3.41	3.75	8.55	2.56	2.75	1.41	4.74	2.22	39.86
58.2	49.0	34.5	24.8	44.4	2.48	2.03	5.41	3.38	5.18	6.72	9.80	3.46	1.78	1.59	6.79	6.52	55.14

MONTHLY AND ANNUAL TEMPERATURE

LOCATION OF STATIONS.		TEMPERATURE—							
STATIONS.	COUNTY.	January.	February.	March.	April.	May.	June.	July.	August.
<i>Northern Plateau—(Con.)</i>									
Little Falls (2a)	Herkimer	19.6	20.6	28.2	41.8	50.0	60.4	69.4	62.4
North Lake	"	17.8	18.6	26.5	37.2	51.6	55.5	67.6	61.2
Lowville	Lewis	18.4	20.8	29.4	42.6	53.2	58.8	70.6	62.8
Number Four	"	17.2	20.0	26.5	40.4	50.2	55.2	68.0	60.2
Kings Station	Saratoga .....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Atlantic Coast</i>									
Brooklyn	Kings	28.6	31.1	38.6	48.5	58.7	65.2	72.6	70.0
Manhattan Beach	"	28.4	34.2	39.7	50.8	61.0	68.1	74.4	71.9
New York City	New York	27.6	30.6	37.5	46.0	56.4	.....	70.9	.....
Willels Point	Queens	29.0	33.0	39.0	49.0	59.0	65.0	73.0	71.0
.....	.....	24.8	30.6	38.9	49.0	59.4	65.8	73.6	70.7
Brentwood	Suffolk	28.2	30.6	38.5	47.2	.....	64.0	72.0	68.4
Stamket	"	30.2	31.2	39.1	48.7	58.6	64.7	72.4	70.0
Bedford	Westchester	27.8	29.7	37.6	48.2	57.9	62.6	71.6	67.5
Priamrose	"	28.4	23.6	38.4	49.2	58.9	66.0	74.1	70.2
<i>Hudson Valley</i>									
Albany	Albany	25.1	26.2	35.2	48.3	59.0	64.3	73.6	68.6
Cedar Hill	"	25.0	26.0	35.0	48.0	59.0	65.0	75.0	70.0
Lebanon Springs	Columbia	22.6	23.6	32.0	.....	.....	.....	.....	.....
Honeymead Brook	Dutchess	24.4	25.2	34.0	46.4	56.7	62.0	71.6	66.4
Poughkeepsie	"	25.0	25.6	35.2	48.0	57.8	63.0	73.0	67.3
Wappingers Falls	"	26.0	27.2	37.6	49.6	61.1	65.8	74.8	68.5
Catskill	Greene	25.6	26.9	35.0	47.8	58.8	63.0	73.3	68.8
West Point	Orange	26.2	27.6	36.7	49.3	60.6	65.6	74.4	71.2
Boysd Corners	Putnam .....	.....	.....	.....	.....	.....	.....	.....	.....
Carmel	Putnam	25.7	27.1	36.4	49.0	59.1	65.8	73.3	67.9
Southeast Reservoir .....	" .....	.....	.....	.....	.....	.....	.....	.....	.....
Eagle Mills	Rensselaer .....	.....	.....	.....	.....	.....	.....	.....	.....
Easton	Washington .....	.....	.....	.....	.....	.....	.....	.....	.....
Greenwich .....	" .....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Mohawk Valley</i>									
Little Falls (1a)	Herkimer	20.2	22.9	30.4	44.9	56.0	61.1	72.3	65.9
Canajoharie	Montgomery	18.4	21.0	28.4	44.1	54.2	59.1	71.2	65.4
St. Johnsville	"	23.0	25.3	33.0	45.8	57.6	62.8	75.1	68.8
Rome	Oneida	20.6	23.0	31.0	44.1	54.7	60.2	70.8	64.8
.....	.....	19.9	22.2	29.4	45.6	55.8	62.2	72.0	64.6
<i>Champlain Valley</i>									
Plattsburgh Barracks	Clinton	19.7	20.5	30.1	44.0	55.4	61.7	71.6	65.7
Ticonderoga	Essex	16.6	17.8	27.8	42.2	53.7	61.6	70.8	65.2
Glens Falls	Warren .....	.....	.....	.....	.....	.....	.....	.....	66.8
Lake George	"	20.8	22.6	30.7	44.9	56.9	62.1	73.1	65.5
.....	.....	21.7	21.1	31.8	45.0	55.5	61.4	70.9	65.3
<i>St. Lawrence Valley</i>									
Alexandria Bay	Jefferson	19.2	20.0	29.7	43.3	54.8	60.8	72.8	64.9
Madison Barracks	"	19.4	20.2	29.8	42.4	.....	59.4	74.2	63.5
Watertown	Jefferson	20.4	.....	32.2	.....	.....	.....	.....	.....
Canton	St. Lawrence .....	.....	18.8	28.8	43.3	54.4	60.5	72.8	64.8
DeKalb Junction .....	" .....	.....	.....	.....	.....	.....	.....	.....	.....
North Hammond	St. Lawrence	20.1	21.2	31.2	44.0	55.0	61.6	73.4	65.8
Ogdensburg	"	19.7	21.0	28.3	44.2	55.2	61.6	72.2	65.8
Potsdam	"	16.6	18.8	27.7	42.7	54.6	60.4	71.4	64.7
<i>Great Lakes</i>									
Westfield	Chautauqua	23.9	26.6	34.3	45.1	54.7	62.1	73.3	66.4
Buffalo	Erie	24.8	28.1	35.8	45.1	55.2	63.2	73.7	55.8
Adams Center	Jefferson	25.0	28.0	35.0	44.0	54.0	62.0	74.0	67.0

AND PRECIPITATION, 1897—(Continued.)

(DEGREES FAHR.).					PRECIPITATION—(INCHES).												
September.	October.	November.	December.	Annual mean.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual total.
55.5	47.6	35.2	23.6	42.9	1.97	1.62	6.66	3.50	5.07	5.49	5.31	3.44	1.85	1.45	6.78	6.46	49.60
55.1	45.9	31.0	20.2	40.7	5.50	2.10	7.20	3.80	4.4	4.50	4.15	4.97	2.60	2.08	10.24	5.74	57.25
57.5	49.4	34.1	24.7	43.4	2.72	1.75	2.97	2.97	3.97	3.40	2.96	3.27	1.72	1.34	5.81	3.02	35.90
54.5	47.4	31.3	21.8	41.1	3.15	3.21	4.25	3.93	3.99	4.29	6.46	4.97	3.37	2.38	6.45	4.60	51.05
.....	.....	.....	.....	.....	2.20	1.75	4.95	3.64	6.35	6.63	8.83	4.70	1.65	1.45	8.15	6.27	56.61
64.1	55.0	43.5	34.9	50.9	3.68	2.87	3.18	3.31	6.25	3.00	11.13	3.53	1.90	1.48	4.77	5.20	50.30
66.6	56.8	44.5	35.6	52.6	4.14	3.20	1.63	2.75	6.90	2.60	11.06	4.07	1.90	1.69	3.66	4.74	50.34
.....	.....	.....	.....	.....	2.82	2.42	2.84	3.26	4.24	.....	8.51	.....	.....	.....	.....	.....	.....
65.0	56.0	44.0	36.0	51.6	3.51	2.72	2.51	2.96	5.30	2.98	9.52	3.14	1.64	0.72	4.44	4.83	44.27
66.1	56.0	44.0	35.3	51.2	3.54	4.68	3.70	3.21	5.90	2.67	9.75	2.26	1.67	0.70	4.66	5.06	47.80
61.6	53.8	42.6	35.2	.....	4.40	2.08	4.40	4.90	.....	3.50	10.00	2.10	2.30	1.50	4.90	5.50	.....
64.8	56.0	45.3	36.7	51.5	3.85	2.56	2.80	3.29	5.38	2.82	18.18	5.03	1.20	1.79	5.76	6.60	59.26
61.3	51.1	42.0	33.4	49.4	3.92	3.28	3.22	0.83	3.10	11.42	4.26	2.75	2.03	.....	5.30	4.23	55.87
63.3	53.0	42.2	32.2	50.5	3.26	2.24	2.82	2.88	6.18	3.35	11.12	3.83	1.84	1.94	4.70	5.42	49.59
61.1	51.7	38.9	30.3	48.5	2.61	2.60	3.12	3.10	4.58	3.92	10.35	4.66	2.01	1.11	5.73	5.16	49.15
63.0	53.0	39.0	29.6	48.9	1.62	2.05	1.85	3.12	4.69	4.45	6.67	4.43	1.87	1.01	4.65	4.38	40.79
.....	.....	.....	.....	.....	2.99	2.50	2.88	.....	.....	.....	7.46	5.14	2.15	0.95	4.77	5.02	.....
59.2	50.3	37.9	29.5	47.0	2.36	2.61	2.56	3.33	4.44	4.55	14.55	4.42	1.62	0.93	5.07	5.39	51.83
61.4	51.9	39.2	33.4	48.4	1.62	2.66	3.00	1.30	3.36	4.25	9.37	2.81	1.63	0.13	5.45	4.57	40.35
61.8	52.6	40.0	31.3	49.7	2.77	2.66	2.79	3.05	3.92	4.55	11.84	5.82	1.88	1.24	7.24	5.99	53.75
62.2	53.2	39.6	31.2	48.8	2.68	3.28	2.04	3.20	5.81	2.84	9.82	4.13	3.99	0.81	7.57	5.98	52.16
60.6	50.0	39.8	31.0	49.4	3.05	3.35	3.35	3.15	4.70	3.20	13.05	5.15	2.90	1.43	5.40	5.60	54.33
.....	.....	.....	.....	.....	4.67	3.14	3.68	2.78	5.56	3.41	12.51	5.63	1.74	2.01	6.31	6.56	57.40
61.8	52.4	39.4	30.8	49.1	3.45	2.76	3.34	3.05	5.96	3.23	16.64	4.90	1.74	0.89	6.22	5.22	57.40
.....	.....	.....	.....	.....	3.55	2.66	3.49	3.05	6.63	3.18	11.15	5.21	1.79	0.93	5.72	4.78	51.54
.....	.....	.....	.....	.....	0.60	2.05	3.41	4.97	4.37	5.56	4.05	3.63	1.25	1.02	4.58	3.87	39.36
.....	.....	.....	.....	.....	2.51	1.43	3.80	.....	.....	.....	7.09	.....	1.82	1.34	5.74	5.08	.....
59.0	50.3	36.6	26.3	.....	.....	.....	.....	.....	.....	.....	.....	1.55	1.73	.....	5.79	4.59	.....
59.2	49.0	35.2	26.5	45.3	1.18	1.48	3.74	2.92	4.18	5.03	5.19	2.87	2.60	0.84	4.53	4.49	38.75
58.7	49.0	34.2	23.4	43.9	1.01	1.73	4.46	4.47	4.39	5.45	4.68	2.52	1.90	1.31	4.80	5.22	41.94
61.7	50.4	37.1	29.4	47.5	.....	1.44	3.08	1.76	3.82	6.31	6.48	2.98	1.98	0.74	4.02	4.60	37.71
58.8	49.3	35.4	29.2	45.1	1.14	.....	2.54	2.39	4.38	3.50	4.67	3.28	1.80	0.93	3.04	4.65	33.27
57.4	47.1	34.0	24.0	44.5	1.00	1.69	4.90	3.36	4.12	4.87	4.92	2.71	2.30	0.38	6.25	3.49	42.09
58.6	49.8	35.1	25.2	44.8	2.51	1.92	3.52	3.35	3.91	5.00	8.28	4.43	1.41	1.46	6.53	3.88	46.23
57.9	47.9	33.0	23.6	43.2	2.98	1.43	2.26	2.67	3.4	3.90	7.19	3.93	1.90	0.52	3.58	1.96	35.73
59.4	50.6	37.4	27.4	.....	.....	.....	.....	.....	.....	.....	.....	3.34	1.32	2.19	5.56	4.10	.....
58.2	49.7	34.1	21.9	45.2	2.37	1.86	4.32	3.60	3.81	6.21	8.82	5.42	1.19	1.52	10.62	4.71	53.86
59.0	51.0	36.0	25.9	45.4	2.19	2.48	3.97	3.85	4.52	4.90	8.83	5.02	1.23	1.59	6.95	4.75	50.28
58.7	49.3	34.8	24.2	44.4	2.0	1.73	3.48	2.64	3.45	2.28	5.16	2.21	1.33	0.80	4.16	3.00	32.24
57.8	50.5	36.3	25.4	.....	1.29	1.79	2.41	1.16	3.99	1.03	2.55	1.90	0.79	0.86	2.66	3.68	24.05
.....	.....	.....	.....	.....	2.46	.....	3.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
57.2	47.6	32.6	22.1	.....	.....	1.65	.....	3.16	3.49	2.50	7.58	3.33	1.24	0.64	5.38	3.21	.....
.....	.....	.....	.....	.....	2.47	1.02	3.19	2.81	3.14	2.65	4.84	2.46	2.37	0.86	4.72	2.84	33.37
60.4	49.6	36.2	25.6	45.4	1.47	1.35	4.82	2.57	3.91	2.92	4.33	2.19	1.70	0.78	4.01	2.51	32.56
60.5	50.4	34.2	23.6	44.7	1.65	1.79	4.18	3.98	2.86	1.88	4.62	1.40	0.56	1.19	4.01	2.77	30.89
57.4	48.4	32.0	21.7	43.0	2.70	2.80	2.70	2.18	3.30	2.70	7.04	1.99	1.31	0.55	4.19	3.26	34.72
62.3	53.2	39.9	29.9	47.6	3.09	1.65	3.31	2.37	2.50	2.77	6.09	2.24	0.83	0.87	4.98	3.36	34.06
62.8	55.0	42.0	32.3	48.6	1.93	1.59	1.84	2.99	3.48	1.80	8.21	3.64	0.58	1.72	4.60	2.71	35.09
63.0	54.0	40.0	30.0	48.0	3.60	3.13	3.54	2.56	2.62	1.95	8.29	2.12	0.31	0.80	5.21	3.59	37.72
.....	.....	.....	.....	.....	1.53	1.41	3.03	3.30	.....	2.05	8.22	3.54	0.78	0.42	3.73	3.95	.....

MONTHLY AND ANNUAL TEMPERA

LOCATION OF STATIONS.		TEMPERATURE—							
STATION.	COUNTY.	January.	February.	March.	April.	May.	June.	July.	August.
<i>Great Lakes (Continued.)</i>									
Pittsford	Monroe.....	24.0	26.6	34.9	45.3	54.4	61.9	72.7	65.7
Rochester	"	24.0	27.0	35.0	46.0	56.0	63.0	74.0	67.0
Scottsville.....	"								
Appleton.....	Niagara.....	24.8	26.6	33.2	44.5	53.7	61.6	72.5	65.1
Fort Niagara.....	Niagara.....	26.0	27.6	33.9	45.2	54.8	.....	74.0	68.0
Niagara Falls.....	"								
Baldwinsville.....	Onondaga.....	22.4	25.7	34.2	46.6	56.8	63.4	74.4	67.6
Lyndonville.....	Orleans.....								
Ridgeway.....	Orleans.....	.....	26.1	34.2	45.2	54.2	62.5	73.2	66.1
Denster.....	Oswego.....								
Fulton.....	"								
Oswego.....	Oswego.....	23.0	25.0	33.0	44.0	53.0	60.0	73.0	66.0
Palermo.....	"	20.6	23.1	31.2	44.1	54.0	61.0	71.6	64.8
Phoenix.....	"								
Lyons.....	Wayne.....	24.8	27.6	35.2	46.0	56.3	62.8	74.1	67.0
Rose.....	"								
Erie, Pa.....	Erie.....	24.0	28.0	36.0	45.0	54.0	62.0	73.0	67.0
<i>Central Lakes</i>		24.2	27.2	35.0	46.3	55.8	62.0	73.2	66.9
Auburn.....	Cayuga.....								
Fleming.....	"	24.0	26.8	34.5	45.7	56.1	62.0	73.4	67.0
Sherwood.....	"								
Skaneateles.....	Onondaga.....								
Watkins.....	Schuyler.....						62.0	73.2	67.0
Romulus.....	Seneca.....	24.8	27.8	35.8	47.0	56.0	62.9	70.4	67.8
Ithaca.....	Tompkins.....	23.7	26.9	34.8	46.2	55.3	60.9	72.4	65.8
Penn Yan.....	Yates.....								67.1
Means.....		22.3	24.6	32.9	45.2	55.6	61.6	72.1	66.0

* Mean Temperatures are derived from tri-daily observations. † Mean temperatures are used in computing means. (1) Voluntary observer. (2) U. S. Weather Bureau. (3a) City derived from maximum and minimum by the ordinary self registering thermometers.

NOTE.—The mean temperature and average total precipitation for the several regions are

TURE AND PRECIPITATION, 1897—(*Concluded*).

(DEGREES FAHR.).					PRECIPITATION—(INCHES).												
September.	October.	November.	December.	Annual mean.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual total.
61.4	52.2	39.6	30.3	47.4	1.83	2.45	3.32	2.23	2.10	3.18	6.37	1.13	0.98	0.97	3.54	2.26	30.36
63.0	54.0	39.0	30.0	48.2	2.47	2.31	3.14	1.63	1.33	2.92	6.37	1.72	0.46	0.97	3.71	3.39	30.42
61.6	52.0	40.3	30.2	47.2	1.42	1.93	2.93	1.98	1.89	3.15	6.58	0.83	1.37	0.68	3.86	.....	.....
.....	.....	.....	.....	.....	2.58	2.46	1.65	5.08	2.14	0.28	1.05	4.40	.....	.....	.....	3.34	29.26
65.2	54.2	41.5	31.2	.....	0.96	1.70	2.50	2.49	3.07	2.15	7.01	1.94	1.00	1.05	3.69	2.77	30.33
.....	.....	.....	.....	.....	1.87	2.07	2.96	3.09	3.23	1.70	6.73	3.38	0.89	1.31	5.19	3.56	35.98
61.6	52.2	38.4	26.4	47.5	5.40	0.99	5.13	2.18	2.22	3.23	5.95	2.63	1.20	0.65	5.05	3.64	38.27
.....	.....	.....	.....	.....	.....	.....	.....	.....	1.74	4.63	2.32	0.29	0.95	4.74	.....	.....	.....
63.2	53.1	40.1	29.9	.....	1.10	1.66	2.66	2.62	2.77	1.79	5.51	1.83	0.47	1.07	5.02	2.80	29.30
.....	.....	.....	.....	.....	4.96	1.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	4.41	1.14	3.35	2.42	2.07	3.78	.....	3.02	1.36	0.46	7.87	4.79	.....
61.0	52.0	39.0	29.0	46.4	6.05	1.26	4.19	2.46	2.76	3.56	3.15	1.70	0.81	0.51	6.56	3.60	36.61
59.3	50.3	36.7	26.3	45.2	6.78	1.14	4.15	1.49	2.99	4.07	4.22	1.00	0.69	0.40	8.17	4.68	39.18
.....	.....	.....	.....	.....	3.83	1.25	4.52	2.39	2.59	3.28	8.56	2.53	1.49	0.90	6.26	3.25	40.85
61.2	53.2	40.6	31.4	48.4	2.27	0.95	2.37	2.14	1.84	2.95	5.04	1.22	1.18	0.48	3.46	3.14	27.04
.....	.....	.....	.....	.....	2.68	1.83	4.01	1.52	2.12	4.75	3.84	1.15	1.12	0.86	4.95	3.57	33.40
64.0	56.0	42.0	32.0	48.6	2.57	1.74	2.79	1.55	3.04	3.01	5.81	4.70	0.54	1.24	4.63	2.73	34.35
62.7	53.4	39.6	30.3	48.0	1.70	1.16	3.23	2.57	3.55	3.21	3.95	1.82	3.23	1.01	3.71	2.43	31.57
62.0	53.3	39.1	29.6	.....	.....	.....	.....	.....	.....	.....	.....	3.29	0.75	4.49	2.92	.....	.....
62.3	54.5	39.0	29.9	48.0	1.90	1.40	2.19	2.21	2.17	3.96	3.86	2.52	3.46	0.80	2.68	1.92	29.07
.....	.....	.....	.....	.....	2.34	1.10	2.99	2.47	3.67	3.90	4.36	1.99	3.07	2.38	3.10	2.55	33.92
.....	.....	.....	.....	.....	1.77	1.45	4.13	3.16	3.31	3.15	4.92	2.09	2.73	0.95	5.79	3.48	36.84
62.9	53.6	40.1	30.2	.....	.....	.....	.....	.....	3.53	2.04	3.19	1.37	2.75	0.52	2.81	.....	.....
63.2	53.4	40.0	30.4	48.6	0.97	0.93	3.80	2.53	4.80	2.71	4.14	0.78	3.95	1.21	4.06	2.01	31.89
61.7	52.1	39.4	30.7	47.5	1.50	0.91	3.04	2.47	3.84	3.54	3.25	2.74	4.72	0.88	4.22	2.56	33.67
63.3	53.3	40.1	31.2	.....	.....	.....	.....	.....	.....	.....	1.28	1.90	0.62	.....	2.61	1.56	.....
60.2	51.1	37.6	28.2	46.4	2.40	1.87	3.41	2.93	4.11	3.65	6.88	3.08	2.01	1.10	4.96	3.90	40.30

derived from maximum and minimum by the Draper Thermograph. || Received too late to be Reservoir. (2a) Intake conduit nine miles north of city. All means not otherwise indicated are derived from the monthly values for the region.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).									
		Annual normal.	Length of rec'd. years.	Record begins.	Record ends.	Mean for the year 1897.	Departure from the normal.	EXTREMES OF ANNUAL MEAN TEMPERATURE.			
								Highest.	Year.	Lowest.	Year.
<i>Western Plateau</i>		46.0	...	...	...	46.8	+0.8	...	...	...	...
Angelica.....	Allegany	44.3	13	1855	1897	45.3	+1.0	45.7	1894	42.7	1892
Humphrey.....	Cattaraugus	45.2	14	1884	1897	45.8	+0.6	47.6	1894	42.6	1885
Elmira.....	Chemung	48.4	13	1854	1897	49.4	+1.0	50.8	1894	45.0	1886
<i>Eastern Plateau</i>		45.0	...	...	...	46.0	+1.0	...	...	...	...
Oxford.....	Chenango	45.2	27	1828	1897	45.6	+0.4	47.6	1828	42.8	1864
Cortland.....	Cortland	44.2	31	1829	1897	45.9	+1.7	46.2	1846	40.8	1856
Cooperstown.....	Otsego	43.8	44	1254	1897	44.4	+0.6	46.9	1870	41.5	1875
Waverly.....	Tioga	46.8	15	1883	1897	47.1	+1.3	49.0	1894	43.8	1885
<i>Northern Plateau</i>		43.4	...	...	...	43.4	0.0	...	...	...	...
Lowville.....	Lewis	43.4	28	1827	1897	43.4	0.0	47.0	1828	39.8	1892
<i>Atlantic Coast</i>		51.1	...	...	...	51.5	+0.4	...	...	...	...
New York city.....	New York	51.6	27	1871	1897	51.6	0.0	54.0	1891	48.7	1875
Setauket.....	Suffolk	50.6	12	1886	1897	51.5	+0.9	51.8	1889	48.8	1888
<i>Hudson Valley</i>		48.0	...	...	...	47.9	-0.1	...	...	...	...
Albany.....	Albany	48.2	24	1874	1897	48.9	+0.7	51.4	1881	43.7	1875
Honeymead Brook.....	Dutchess	47.7	17	1881	1897	46.9	-0.8	49.4	1889	45.6	1893
<i>Champlain Valley</i>		44.9	...	...	...	43.2	-1.7	...	...	...	...
Plattsburgh Barracks.....	Clinton	44.9	41	1839	1897	43.2	-1.7	46.4	1870	40.4	1875
<i>St. Lawrence Valley</i>		44.5	...	...	...	44.2	+0.6	...	...	...	...
Madison Barracks.....	Jefferson	45.2	30	1839	1896	...	...	47.7	1804	42.1	1875
Canton.....	St. Lawrence	45.5	31	1862	1896	...	...	47.2	1878	40.4	1875
North Hammond.....	"	45.3	13	1867	1897	45.4	+0.1	49.5	1870	42.8	1892
Potsdam.....	"	41.9	27	1828	1897	43.0	+1.1	46.0	1828	40.8	1836
<i>Great Lakes</i>		46.6	...	...	...	47.3	+0.8	...	...	...	...
Buffalo.....	Erie	46.6	27	1870	1897	48.0	+1.4	48.8	1878	42.7	1875
Rochester.....	Monroe	47.0	26	1871	1897	48.2	+1.2	49.6	1878	43.8	1885
Fort Niagara.....	Niagara	47.4	36	1842	1896	...	...	50.8	1878	44.4	1875
Baldwinsville.....	Onondaga	46.1	19	1854	1897	47.5	+1.4	48.2	1878	43.7	1856
Oswego.....	Oswego	46.3	27	1871	1897	46.4	+0.1	51.2	1878	42.2	1885
Palermo.....	"	44.4	38	1860	1897	45.2	+0.8	47.8	1878	41.0	1885
Erie, Pennsylvania.....	Erie	48.5	24	1874	1897	48.6	+0.1	51.7	1878	42.9	1890
<i>Central Lakes</i>		47.0	...	...	...	47.5	+0.5	...	...	...	...
Ithaca.....	Tompkins	47.0	19	1879	1897	47.5	+0.5	49.5	1891	44.3	1885
Average departure.....		...	...	...	...	...	+0.6	...	...	...	...

AND PRECIPITATION — ANNUAL.

STATION.	COUNTY.	PRECIPITATION — (INCHES).									
		Annual average.	Length of record, years.	Record begins.	Record ends.	Total for the year 1897.	Departure from the average.	EXTREMES OF ANNUAL PRECIPITATION.			
								Greatest.	Year.	Least.	Year.
<i>Western Plateau</i>		39.73	..	.....	.....	34.02	-4.81	.....	.....	.....	.....
Angelica	Allegany	40.06	9	1872	1897	37.15	-2.9	52.07	1890	28.61	1872
Humphrey	Cattaraugus	44.18	14	1884	1897	37.47	-6.71	59.29	1890	30.70	1895
Elmira	Chemung	34.94	13	1854	1897	30.13	-4.81	50.71	1860	25.77	1895
<i>Eastern Plateau</i>		38.51	..	.....	.....	41.16	+2.65	.....	.....	.....	.....
Oxford	Chenango	37.35	26	1829	1897	45.47	+8.12	42.39	1353	29.13	1856
Cortland	Cortland	37.64	19	1851	1897	39.98	-6.66	55.25	1857	30.98	1897
Cooper-town	Otsego	38.86	44	1854	1897	46.52	+7.66	58.13	1890	29.90	1864
Port Jervis	Orange	44.18	13	1880	1897	49.27	+5.09	55.05	1890	31.90	1880
Waverly	Tioga	34.54	15	1883	1897	33.57	-0.97	48.49	1890	26.25	1895
<i>Northern Plateau</i>		35.05	..	.....	.....	35.90	+0.85	.....	.....	.....	.....
Lowville	Lewis	35.05	30	1827	1897	35.90	+0.85	47.32	1857	26.47	1844
<i>Atlantic Coast</i>		46.22	..	.....	.....	51.76	+5.54	.....	.....	.....	.....
New York city	New York	44.63	27	1871	1897	44.27	-0.36	58.68	1889	35.73	1895
Setauket	Suffolk	47.82	12	1886	1897	59.26	+11.44	59.26	1897	37.38	1896
<i>Hudson Valley</i>		41.91	..	.....	.....	48.94	+7.03	.....	.....	.....	.....
Albany	Albany	35.82	24	1874	1897	40.79	+4.97	49.37	1878	25.84	1891
Hon-y-mead Brook	Dutchess	41.37	17	1881	1897	51.83	+10.46	51.83	1897	34.48	1886
Poughkeepsie	"	36.02	2	1830	1897	40.35	+4.33	49.63	1831	28.67	1849
West Point	Orange	47.58	42	1840	1897	54.33	+6.75	63.56	1853	28.37	1844
Boyd's Corners	Putnam	48.77	27	1870	1897	57.49	+8.63	63.51	1888	38.52	1860
<i>Champlain Valley</i>		29.95	..	.....	.....	35.73	+5.78	.....	.....	.....	.....
Plattsburgh Barracks	Clinton	29.95	6	1840	1897	35.73	+5.78	43.90	1850	18.91	1887
<i>St. Lawrence Valley</i>		32.61	..	.....	.....	30.44	-2.17	.....	.....	.....	.....
Madison Barracks	Jefferson	29.89	27	1841	1897	24.07	-5.84	55.73	1889	22.26	1879
North Hammond	St. Lawrence	36.55	12	1867	1897	32.56	-3.99	46.71	1867	27.00	1874
Potsdam	"	31.40	27	1828	1897	34.72	+3.32	52.30	1889	18.54	1836
<i>Great Lakes</i>		35.46	..	.....	.....	34.77	-0.69	.....	.....	.....	.....
Buffalo	Erie	38.05	27	1871	1897	37.72	-0.33	60.24	1878	30.44	1874
Rochester	Monroe	34.88	26	1871	1897	30.42	-4.46	49.89	1873	20.30	1887
Fort Niagara	Niagara	27.35	33	1842	1897	30.33	+2.98	40.82	1878	16.71	1884
Oswego	Oswego	35.20	27	1871	1897	36.61	+1.41	55.83	1878	23.41	1887
Palermo	"	36.57	8	1860	1897	39.18	+2.61	49.40	1864	24.19	1884
Erie, Pennsylvania	Erie	40.73	24	1874	1897	34.35	-6.38	55.23	1878	30.24	1891
<i>Central Lakes</i>		34.27	..	.....	.....	33.67	-0.70	.....	.....	.....	.....
Ithaca	Tompkins	34.27	19	1879	1897	33.67	-0.70	46.39	1890	19.74	1879
Average departure .....		.....	.....	.....	.....	.....	+1.49	.....	.....	.....	.....



MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR THE YEAR 1897







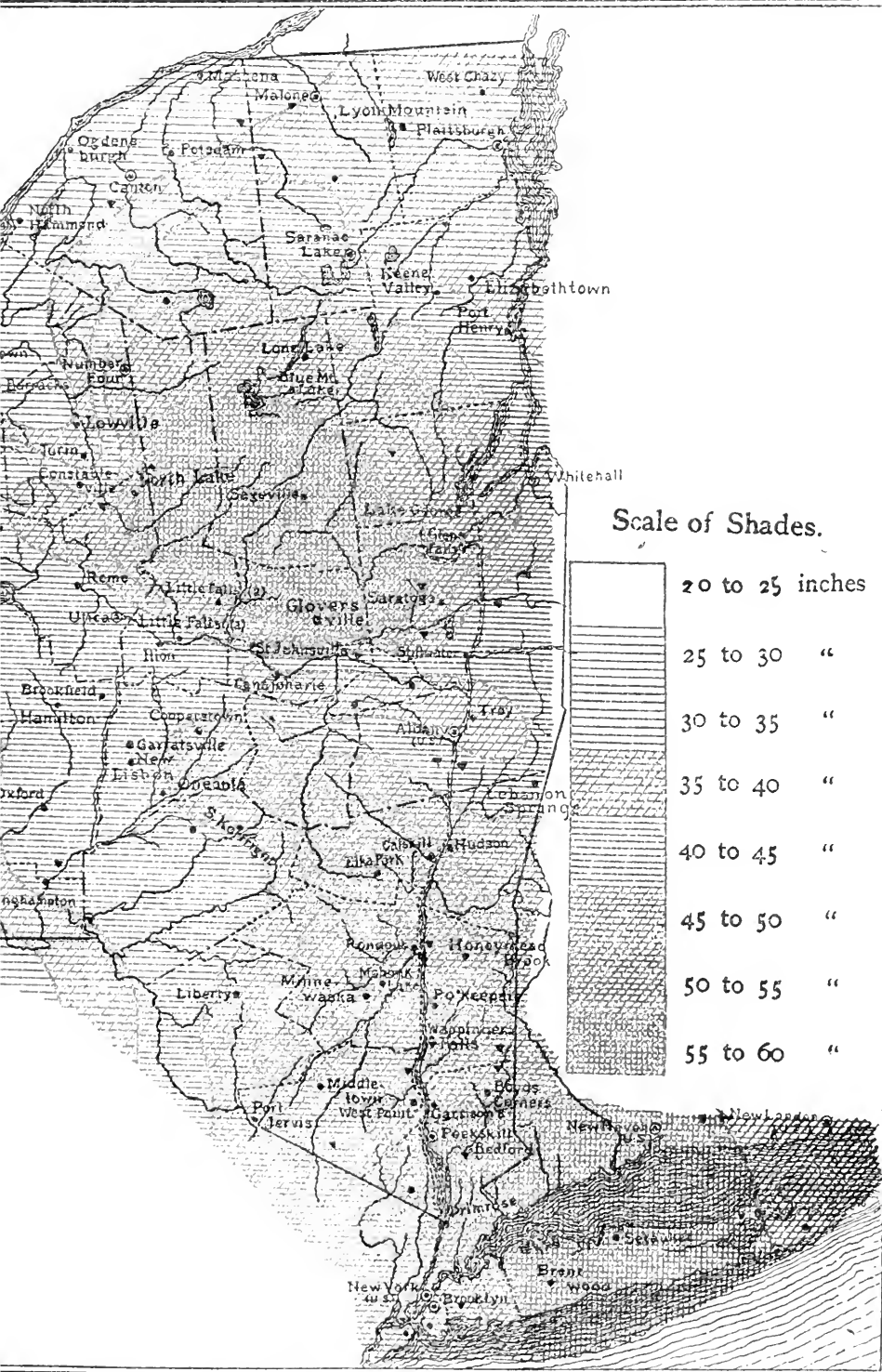
MAP OF THE STATE OF NEW YORK

SHOWING

THE TOTAL PRECIPITATION

FOR THE YEAR 1897



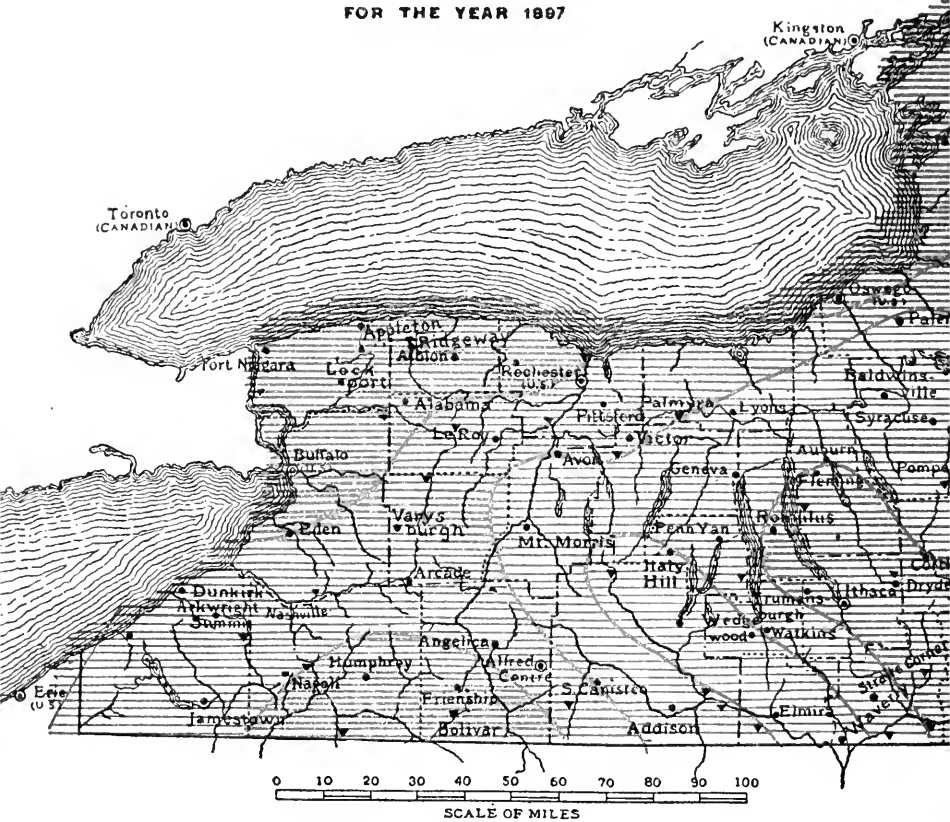


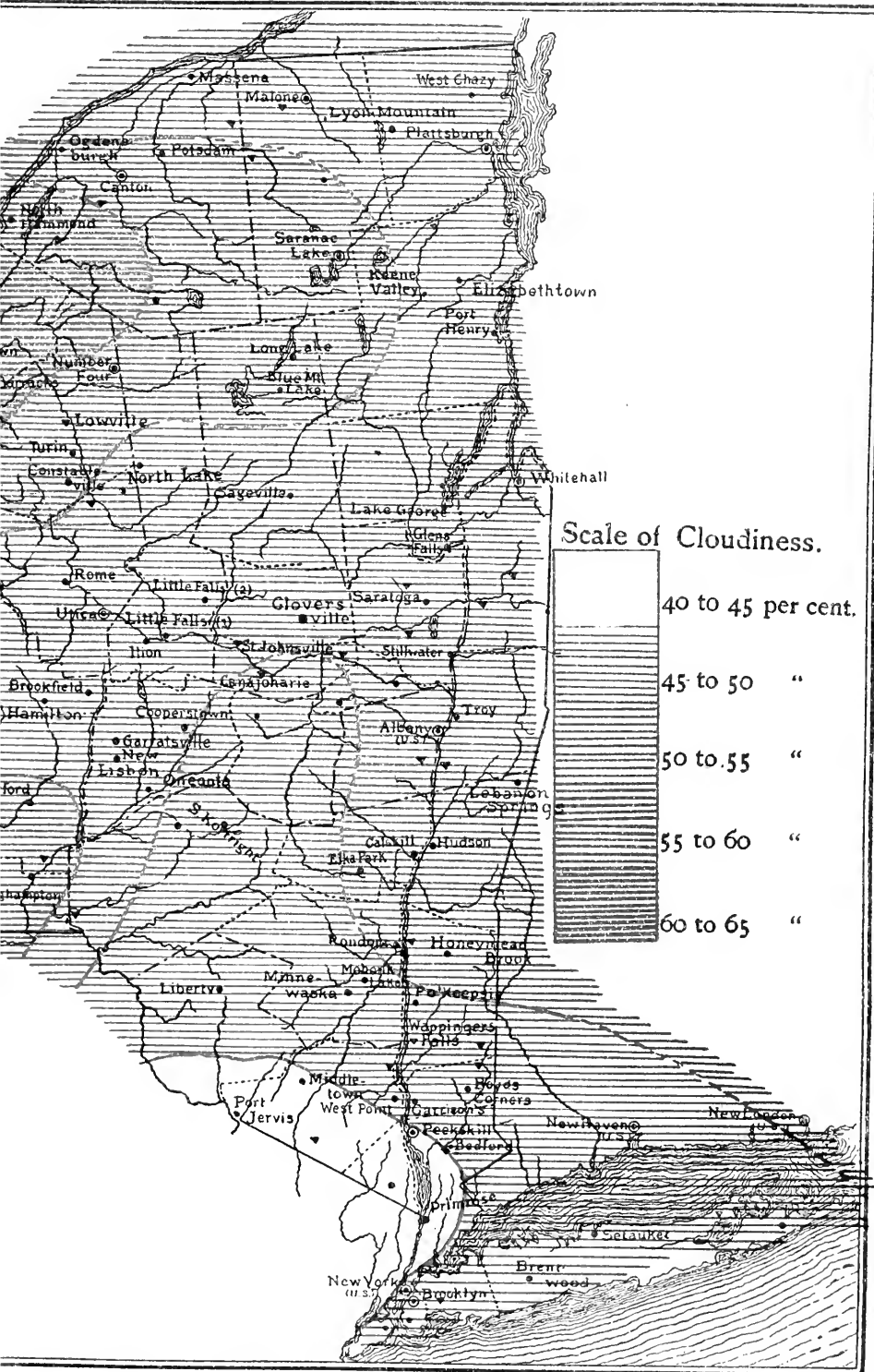
MAP OF THE STATE OF NEW YORK

SHOWING

THE RELATIVE CLOUDINESS

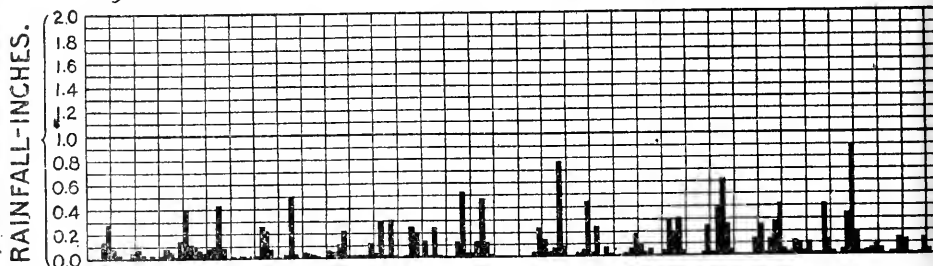
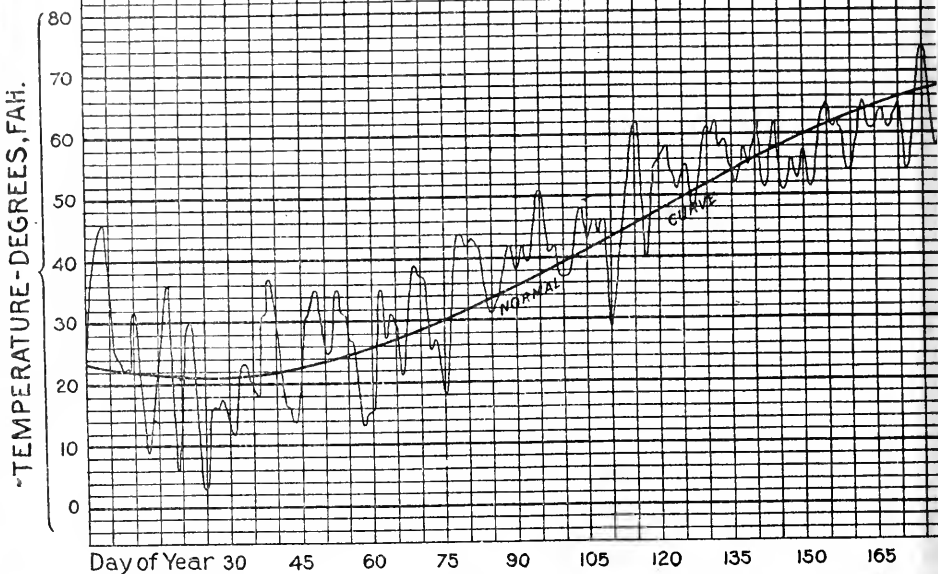
FOR THE YEAR 1897





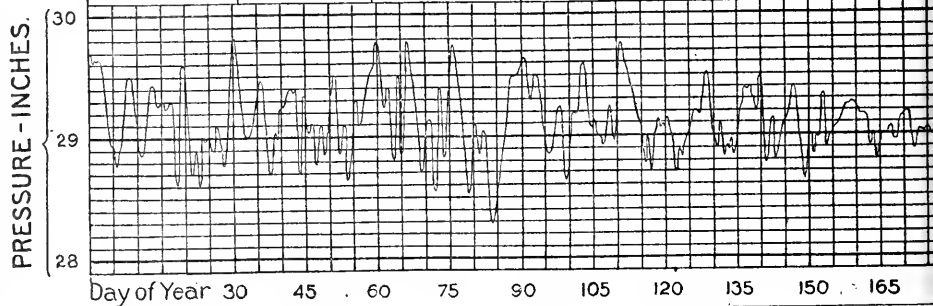
AVERAGE DAILY TEMPERATURE AND P

January			February			March			April			May			June		
5	15	25	4	14	24	6	16	26	5	15	25	5	15	25	4	14	24

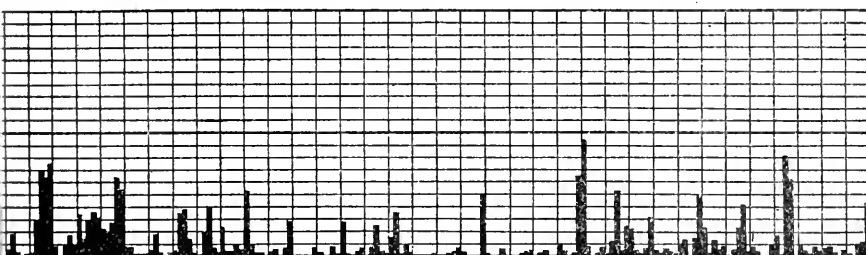
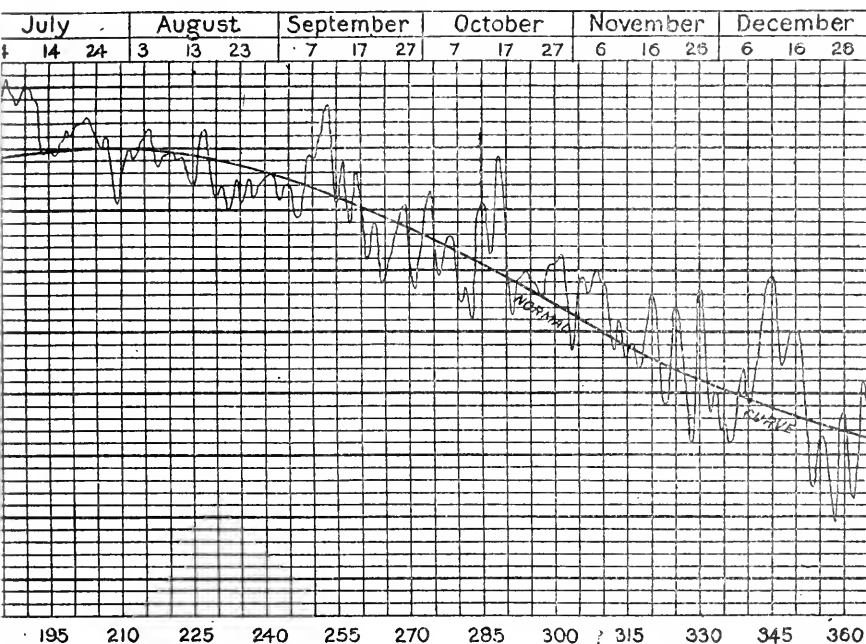


ATMOSPHERIC PRESSURES RECORDED

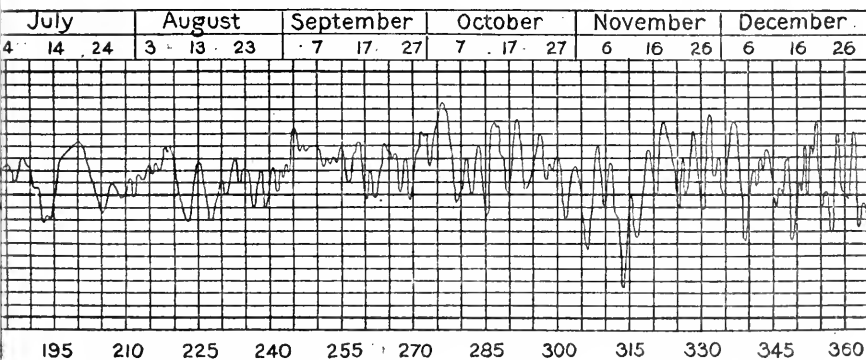
January			February			March			April			May			June		
5	15	25	4	14	24	6	16	26	5	15	25	5	15	25	4	14	24



PRECIPITATION OVER THE STATE 1897.



ITHACA DURING 1897 (810 FEET ABOVE TIDE).



SECTION III.

Review of Crop Conditions During the Year.

Sample Crop Report.



Summary of Crop Conditions, 1897.

November 1, 1897.

The temperature from October, 1896, to March, 1897, inclusive, averaged about 0.7 degree above the normal; the average deficiency of rain and snow for the same period was about 0.4 inch. The winter temperature was about normal, December being colder, while January and February were slightly warmer. It is worthy of note that every month from October to February, inclusive, was deficient in precipitation. November, 1896, was very warm, averaging nearly 5 degrees above the normal. Plowing was carried on, even in the extreme north, up to the 28th of November, and in southern sections violets and lilacs were budding near the close of the month. Some plowing was done during January also. While the ground was often free from snow during the winter, yet protection to crops was afforded at opportune times and grasses and grains generally wintered well—the exception being in eastern and southeastern sections, where it was thought some fields were partially winter killed.

On the first of March a hard freeze was reported as having killed many peach buds in Erie county and vicinity, but the results of the season did not bear out this statement. The succeeding twenty days averaged the warmest on record. This was followed by a period of cold north winds and frosty nights, with bright sunny days. As the fields were bare of snow the alternate freezing and thawing caused some slight damage to fields and meadows from heaving. Excepting in the extreme north the frost was all out by the close of March, and spring plowing had begun in the warmer localities of the south.

The first week of April was bright and warm, but with frosty nights. Plowing was well begun in warmer sections, and the season was deemed to be two weeks in advance. The weather was excellent for gathering maple sugar, and while the sugar season was rather short—being practically finished by the 10th—the product was exceptionally good. General snows on the 9th delayed farming operations, but proved beneficial to grass and grains. Excepting the 17th and 18th the second decade of April was cold and wet; grass and grains received a set back in growth, but otherwise continued in good condition. Oats seeding—a little of which had been done—and plowing progressed slowly. A few potatoes had been planted by the 10th, and gardening had begun in the warmer sections of the southeast. Fruit buds were developing too rapidly for the season, and received a timely check during the cold spell of the 17th-21st. The cold wave of the 19th, 20th and 21st was accompanied by sleet and snow, and ice two inches thick formed in exposed localities of the north. Little damage to crops was apprehended, excepting to peaches, and to early gardens on Long Island. Midsummer temperatures followed, and as the soil was in good condition plowing and seeding progressed rapidly. Much tobacco was seeded by the 20th, and hop poles generally were set. Another cold wave on the 26th-27th was accompanied by snow to the depth of two inches in the north. Before this cold wave vegetation was slightly in advance, but afterwards was deemed about normal. Fruit was thought to be injured by the frost of the 27th, and in Orange county early potatoes suffered, and accompanying high winds greatly damaged the young onion beds. At the close of the month a large percentage of the oats was sown, and some barley; and plowing for corn, planting potatoes and making gardens was well under way.

All crops in the ground were growing nicely. In central and southern sections early fruit sprang into full bloom during the last two or three days of the month and reports indicated a heavy set, especially of small fruits. Farming operations had hardly begun in the extreme north.

The month of May was cooler than usual, the average temperature for the first and last decade being low, and about normal during the intermediate period. The rainfall was excessive, but unevenly distributed; numerous and heavy showers occurring over the southeast principally, but in some sections—and notably in the vicinity of Lake Ontario—the precipitation was light. Vegetation advanced rapidly until the 8th, when the temperature fell to five and ten degrees below freezing. The damage sustained was very slight. Cloudy weather with general rains from the 9th to the 13th proved beneficial to grass and grains, but in the north meadows were reported in poor condition. Cool, cloudy and showery weather prevailed during the last ten days. Many reported corn, potatoes, peas, etc., in the ground as failing to sprout during this period, and growth of small fruits and garden truck was seriously retarded. Grass and grains, however, grew vigorously with this weather, and in the warmer and dryer portions of the southeast ripening strawberries were exceptionally promising. Tent caterpillars were exceptionally numerous, and orchardists were obliged to use vigorous methods to protect their fruit trees. Exceptionally cool, cloudy and windy weather prevailed over the northern sections of the State. Corn planting was well under way by the 10th of the month; hops were mostly grubbed; and as pasturage was very good, stock generally was turned out. By the middle of the month early vegetables were in the market in the southeastern counties, but in the north oats seeding had

scarcely begun. Many had finished sowing barley and, in warmer districts, rye was beginning to head. Hop vines were strong and vigorous, and tying well under way by the 15th. The cool, cloudy weather was unfavorable to tobacco plants and they made slow growth. Planting potatoes, truck gardening, etc., was well advanced, except in localities of heavier soils where work was deemed ten days behind hand. In the warmest sections apple trees were in full bloom, but in the north plums, pears and cherries were just starting to blossom. A frost on the 22d slightly nipped tender garden plants, but did not impair the generally favorable outlook. At the beginning of the third decade grasses, grains and fruits were growing nicely, and were reported by many as "never looking better at this season of the year," but it was too cool for the quick germination of seed in the ground. Frosts of 26th-27th slightly damaged fruits and gardens in a few exposed localities. In many districts corn and potato planting was finished by the end of the month, but on uplands and wet soils many had scarcely begun.

June was an exceptionally cool month, the principal cold periods occurring about the 2d and 21st. Severe frosts occurred in northern localities and also in the southwest. The rainfall was very light in the west, but heavier than usual in the central and eastern counties. About the usual rain frequency and cloudiness prevailed for the State at large and after the 10th the prevailing weather was fair. During the first decade the frequent rains and cool cloudy weather retarded corn planting and oats seeding, and the season already being late many of the fields designed for oats were prepared for millet or buckwheat instead. Corn and potato seedlings rotted badly during this weather and much replanting became necessary. Haying had begun in southeastern localities by

the 10th, and as the crops had become very weedy cultivation of corn and potatoes was begun, although in many districts corn and potato planting was not yet finished. Wheat headed during the second week and some was nearly ready to harvest by the close of the month. Small fruits and vegetables, while maintaining a vigorous growth, were kept in a very backward condition. Beans generally were planted by the 10th, and a particularly good crop of strawberries came to market by the 12th. Hops promised well early in the month, but later the growth became uneven, and lice were reported in the yards. Tobacco transplanting was finished by the 25th; the plants suffered somewhat from the cool weather. The weather was very favorable during the last week, and by the close of the month a large proportion of the hay, especially clover, was secured, and about all the buckwheat sown. Wheat, barley, oats and rye were growing nicely, although in some sections rust was reported in the wheat and oats. Strawberries were nearly finished in the southeast, but in northern sections the crop was in the prime. Apples were reported as dropping very badly, but small fruits and berries continued most promising. Frosts on the 21st and 27th slightly nipped gardens in exposed localities.

July was remarkable for excessive heat and rainfall. The excess of temperature occurred mainly from the 2d to the 12th, maxima of 100 degrees being reported from stations in the Genesee valley on and about the 5th. From the 12th to the 26th the temperature was slightly above the normal, but a cool wave followed from the 26th to the 31st, with minima under 50 degrees in the cooler sections. Rainfall was very unevenly distributed, portions of the west, central and the St. Lawrence Valley reported a drouth, while at many eastern stations the rainfall was the heaviest on record. Phenomenally large amounts in single storms were regis-

tered. The total monthly amount at Setauket, Long Island, was 18.18 inches, which, as far as known, is without precedent in this State. Hail, wind and thunder storms were a noteworthy feature of the month's weather. Flooding rains did much damage to crops, especially in the Hudson Valley. After the cool weather of May and June (excepting the last week of June) the hot weather of July was very beneficial to crops, which were generally much behindhand. The bright, hot weather ripened the grain rapidly, and by the 10th wheat and rye harvest was well begun in more advanced districts. The weather was very favorable for gathering, and the greater part of the crop was secured by the middle of the month, or before the showery weather which characterized the last half of the month. The almost daily showers from the 12th on caused serious delays in the wheat harvest. A large amount of the wheat became over ripe and could not be cut, while much that was cut and shocked remained in the fields often as long as two weeks, causing sprouting and deterioration of the grain. This period of continued rains, with its ill effects on wheat, barley and rye harvests, may be deemed the catastrophe of the season, as a large proportion of the wheat, especially, was rendered unmarketable. Where dry weather permitted oats harvest began during the latter part of the month; the flooding rains had caused much damage from lodging, and rust and smut were reported locally, but as a whole the crop had made a very good growth. Corn was still behindhand although growing finely. Earliest potatoes were ready to dig the last part of the month; rot was beginning to be general, and the crop was further impaired by the wet weather and by insect pests. As it was impossible to cut hay, much of the crop that remained out became overripe, resulting in considerable loss. The warm, wet weather

was very favorable to tobacco plants. Hops improved towards the close of the month, the heavy rains seeming to rid the yards of lice. Pasturage continued in excellent condition and dairy interests consequently at a maximum. Cherries, plums and peaches continued very promising; blackberries and raspberries were abundant; but apples continued to drop badly and promised a very light yield.

August was cooler than usual, especially in the northern part of the State. The temperature was equable, moderate deficiencies being maintained during more than half the month, while the brief warm waves of the first and middle of the month were severe only in portions of the western sections. Fair and pleasant weather prevailed in central and western counties, while in the northern highlands the number of cloudy and rainy days was excessive. The total rainfall for the State was deficient, and in southwestern counties drouth prevailed, and also in the vicinity of Lake Ontario. As a whole the month was fairly favorable for agricultural interests; wet weather delayed harvests in the north and east, while growing crops were somewhat injured by drouth in some western counties. Bright, drying weather during the first week was favorable both for harvesting and for growing crops. Following the almost daily rains of the last three weeks of July the drying weather was a boon to farming interests, and by the end of the first week nearly all the wheat, barley and rye were secured, excepting in the north. While great damage to grains had been caused by the wet weather later reports indicated that the loss had not been quite so extensive as previously feared. Haying was rushed during this time, but much loss resulted from the grass being overripe. Corn steadily improved; by the 10th corn was in tassel and buckwheat in bloom. Vegetable and tree

fruits, excepting apples, made vigorous growth. The two weeks of cool showery weather following still further delayed late grain and hay harvest, and maturing crops made stop growth, although many central and western districts escaped the showers and reported a drouth. The second growth of clover was unusually good, and the greater part of this crop cut by the 20th. Some Fall plowing had begun by the 15th; some tobacco was cut, although the harvest in general was later than usual. Oats harvest was well under way by the third week, and some fodder corn was cut by the end of the month. Oats, although heavy, were badly lodged, causing deterioration in the crop and delay in the harvest. Early potatoes were blighting badly; late potatoes were much more promising. Hops improved slightly; picking the earlier varieties began the last week. Pastures afterfeed continued excellent and dairy interests very satisfactory. Apples continued to drop and otherwise the crop was defective; other fruits were very promising. Near the middle of the month some orchardists were obliged to thin their peach trees of fruit.

September temperature was about normal—the weather being exceptionally dry, with warm, bright days but cool nights. The unusually warm weather continued up to the last decade, but was followed by cool weather, with light frosts on the 21st-22d, which caused some slight damage to buckwheat and to late corn and gardens. The dry weather was exceptionally favorable for finishing up late harvest and securing corn fodder, buckwheat and late second clover, but with the exception of the period from the 19th to the 26th when copious showers occurred over all but western sections, the protracted drouth was causing serious delay in fall sowing, especially in the western part of the State where the rain-

fall had been unusually light during the whole season. At the beginning of the month corn and buckwheat were backward but ripening rapidly, and cutting was general during the second decade. As corn was so late in ripening, especially in the north, much of the crop was cut rather green from fear of frost. Potato digging revealed widespread rot, the tubers rotting both in the ground and after being dug. The very good crop of tobacco was about all securely housed by the 15th, and hop picking was nearly finished. Hops yielded fairly well, but the berry was rather small. The weather was particularly favorable for maturing crops, and for finishing up the harvests of late oats and second hay. Grapes came to market the first of the month; the crop generally was very good, although there was complaint of lack of sugar in the fruit. Peaches were unusually abundant, and so were pears and plums, but the apple prospects continued to decrease. At the close of the month there was much complaint of drouth in western and northern counties, and consequent delay in fall plowing and seeding.

Bright, dry weather continued up to the last week of October. Throughout the greater part of the State pasturage continued in very good condition, fall plowing and seeding were finished seasonably, and farming interests were quite satisfactory. In northern and western counties, however, the rainfall had been extremely light since the first part of August, and as the soil had become too hard to work many farmers were awaiting rain before putting in the fall crops. In these sections much of the seed sown earlier in the season failed to sprout in the dry ground, and in many cases fields were plowed up to be reseeded when rain comes. Wells and springs were exceptionally low, and pastures dried up, making it necessary to feed stock from winter stores. During the

last week of October good showers occurred over the drouth-stricken counties, and the long deferred plowing and sowing were resumed under more favorable conditions. Owing to the mild weather of September and October fall wheat has made rapid growth, and there was some fear expressed that the crop will be too far advanced before winter sets in.

SPECIMEN COPY OF THE CROP BULLETIN OF THE STATE
OF NEW YORK WEATHER BUREAU, IN CO-OPERATION
WITH THE UNITED STATES DEPARTMENT OF AGRICUL-
TURE WEATHER BUREAU.

Vol. IX. For the week ending Saturday, July 31, 1897. No. 15.

CORNELL UNIVERSITY,

ITHACA, N. Y., *August 3, 1897.*

The following information is condensed from the reports of crop correspondents for the week ending Saturday, July 31, 1897:

Albany County (Cedar Hill).—Rains completely stopped all field work. Much rye remains in shock and is sprouting. Grass remains uncut and is spoiling on the fields. On low grounds corn has turned yellow. Rain, 2.01.

Allegany County (Bolivar).—Slow haying, and grass looks bad. Rain, 1.07. Friendship.—Rain has fallen from the 11th to 31st, inclusive, and haying and farm work has been at a standstill. Rain, 0.68.

Broome County (Binghamton).—Rain every day. Several hundred tons of hay in this county have lain under water during the past week. It is said that grain is sprouting in shock. Fruits look fine; probably will be the best in years.

Cattaraugus County (Franklinville).—Hay slightly damaged by rains. Large part of crop secured during past two days. Oats well filled; some rusting slightly. Immense growth of potato vines, but the tubers not developing well in hill. They are few, and of small size. Rain, 0.64. Humphrey.—Rain for nineteen days in succession. Haying greatly delayed; considerable spoilt. Apples cracking open, and covered with spots. Milk yield good. Late oats rusting some, and a few fields of potatoes struck with blight. Rain, 1.66.

Cayuga County (Sherwood).—Rained every day for fourteen days, preceded by "catchy" haying weather. Hundreds of tons of fine timothy hay seriously injured by the rains. Many over ripe fields still to cut. Wheat all cut, but mostly still in shock; some sprouted. All barley badly lodged, and many pieces dead ripe. Oats have a good straw, but is badly lodged. Raspberries fine. Rain, 1.23. Cascade.—Standing wheat not much damaged, but cut wheat in the fields rendered unmarketable. Some hay yet to be cut; a great amount damaged.

Chautauqua County (Cherry Creek).—Hay, wheat and oats harvest at a complete standstill. Late oats and barley is lodged and badly rusting. Second hay crop looks more promising than in years. Buckwheat in full bloom, and very promising. Early corn fine. Early potatoes rusting and rotting in some fields. Rain, 1.45. Jamestown.—A week disastrous to the farmer. Haying at a standstill; grass ripening, and growing at the bottom; winter grains growing and badly rotted. Fruits doing well. Rain, 0.41. Poland Center.—Much hay yet out; rain nearly every day. Some wheat reported sprouting, and some potatoes rotting. Dunkirk.—Peach trees heavily loaded. Not dropping at all. Wheat was much damaged by the rain. Peas about gathered. Rain, 1.58.

Columbia County (Canaan Center).—Very heavy rain. Rye in shock is spoiled; that standing is over ripe. Little grass cut; it is over ripe, and badly lodged. Potatoes rotting, and under water in many places. Oats were badly lodged with the last rains. Apples falling and wormy. Buckwheat very fine. Farm work far behind.

Dutchess County (Bangall).—Rain every day for ten days. Until 30th was impossible to secure crops. Oats over ripe; in fair condition, but none harvested. Unprecedented July rainfall, 14.51 inches. Rain, 2.81. Wappingers Falls.—Everything soaked through and through. Farmers trying to estimate their loss, which will be enormous. All grain cut and in the field practically worthless. Uncut hay over ripe, and of little value. Oats and other grain uncut beaten down, rotting, and for the most part practically worthless. Berries and currants cut short. Other fruits doing well. Buckwheat poor; tomatoes backward; corn very promising. Rain, 4.15.

Erie County (Buffalo).—Rain, 2.21.

Jefferson County (Carthage).—Too wet for haying; many tons spoiled. Grain badly lodged, and corn flat on the ground. Early potatoes small, and a light crop; late ones promising.

Lewis County (Lowville).—Some hay cut ten days ago still in the fields, and more or less damaged. Uncut timothy over ripe. Other crops doing well. Some grain lodged. Rain, 1.19.

Livingston County (Avon).—Very little wheat secured, nearly all damaged by wet weather. Much of it sprouting in shock. Rain, 1.58. Mt. Morris.—All work delayed; wheat and rye greatly damaged. What hay was out is spoilt. Some oats cut; good crop. Corn and beans growing rapidly; good fall feed in abundance. Rain, 0.80.

Madison County (Bouckville).—Large quantity of hay ruined by the rains, and all work greatly delayed. Hop prospects continue to improve. Apples look better. Oats harvest begun. Corn, potatoes, sugar beets and garden vegetables growing fast. Pastures and minor crops excellent. Rain, 2.91. Munnsville.—All the wheat out, whether cut or standing, is growing. Some are putting wheat on hop kilns to dry out. Oats slightly affected with smut. Some are threshing.

Monroe County (Rochester).—Rain, 144.

New York City.—Rain, 2.81.

Niagara County (Appleton).—Rain for ten consecutive days. Nearly all the wheat, and much of the barley, was in the fields, resulting in the loss of fully two-thirds of the wheat, and rendering the barley unsalable. In the interior and southern part of the county the wheat shocks grown solidly together, and water is still standing in many fields. Uncut barley badly colored. Some claim that this county will not turn out sufficient sound wheat for its bread. Rain, 1.84. Niagara Falls.—Grain and hay much damaged. Hot weather causing peaches to rot. Rain, 2.90.

Oneida County (Chuckery).—Rain almost continually for past two weeks, doing great damage to hay and wheat. Wheat reported as sprouting though uncut. Oats badly lodged. Some corn blown down. Hops will be light and apples scarce. Milk decreasing. Deansboro.—Hundreds of acres of wheat sprouted, and for the most part spoilt. Large amount of hay about destroyed; much haying yet to be done. Oats ready to cut, but is badly lodged. Farmers two weeks behind with work.

Onondaga County (Baldwinsville).—All work stopped until Saturday, when a large acreage of wheat secured in fair order. Most of the wheat started to grow in shock. Oats harvest begun;

good crop. All crops very weedy. Tobacco making rapid growth, but crop is uneven. Potato prospects not flattering. Corn doing fairly well, but will not be a big crop. Plenty of pears, plums and grapes, but few apples. Oran.—Farming at a complete standstill. About a third of the hay uncut, over ripe and spoiling. Much wheat cut, but little housed. Some has been in shock two weeks, and all is sprouted. Standing wheat also is sprouting. Oats badly lodged. Too wet to harvest. Early potatoes rotting. Cloudburst 24th did thousands of dollars damage in valleys and lowlands; estimated rainfall from 10 to 15 inches.

Ontario County (Phelps).—A little rain every day, but soil dry enough to hold the moisture. Some damage to grain. Potatoes and cabbages improving. Plums and pears fine; apples growing less every day. Berries fine.

Orange County (Port Jervis).—Considerable rye and hay damaged by continued rains. Potatoes rotting,—in some places very badly. Other crops doing well. Rain, 4.69.

Orleans County (Lyndonville).—Continued wet weather has caused wheat to sprout in shock, and has also damaged beans to some extent. Rain, 1.21. Ridgeway.—Wheat remaining out has nearly all sprouted, and is greatly damaged. Barley in nearly as bad shape. Some hay yet to be secured. Corn and beans getting weedy. Potato bugs giving much trouble. Rain, 2.01.

Oswego County (Oswego).—Rain, 1.06. Palermo.—Rain every day for two weeks. Much hay damaged. Oats badly lodged. Pastures never better. Corn growing very fast. Potatoes light. Rain, 1.44.

Otsego County (Cooperstown).—Haying at a standstill and much of the hay damaged. Pastures and afterfeed much benefited; corn and buckwheat made a good advance. Early oats ready to cut. Rain, 1.81.

Rensselaer County (Eagle Mills).—All crops growing finely, but harvest delayed by rains. Most of the rye exposed in shocks. Rain, 1.80.

Saratoga County (Kings Station).—But little hay cut owing to excessive rains. Rye mostly on shock. Early potatoes a light crop; corn growing well. Oats heading well. Rain, 2.10.

Schoharie County (Hyndsville).—Everything almost drowned out. Rye cut; haying stopped. Buckwheat coming, but may be drowned out. Potatoes rotting some. Rye in swath and sheaf sprouting, and also some uncut.

Schuyler County (Perry City).—Haying well advanced; much damaged by the rains, and some about spoilt. Wheat growing some in shock, and some standing is sprouting. Buckwheat doing well. Corn looks well; potatoes improving. Apples dropping some yet. Rain, 1.53.

Steuben County (Addison).—Rain, 1.70. Atlanta.—Rain and winds of 26th very damaging to crops in this vicinity. Wheat and rye cut has sprouted badly, and some uncut has grown. What hay was cut and out was spoiled. Rain, 4.17.

St. Lawrence County (DeKalb Junction).—Haying delayed during last ten days. Timothy getting ripe and should be cut. Oats badly lodged. Barley beginning to ripen. Rye is cut and has been in the shock ever since the rains began. Corn and potatoes growing finely. The honey crop is below the average. Rain, 2.43. Massena.—Disastrous week to farmers. Hundreds of tons of hay ruined. Water standing on all lowlands. Little grain has been harvested, and what has been cut will be damaged.

Tioga County (Straits Corners).—Very wet and not much work done. Very much hay rendered worthless by the rains. Buckwheat looking fine. Oats lodging quite badly. Rain, 2.07.

Tompkins County (Ithaca).—Wet and threatening weather has greatly delayed harvests, and considerable damage has resulted to grass and grains remaining out. In this vicinity little damage has been done to grain where it was well shocked. Rain, 1.26.

Warren County (Lake George).—Lack of sunshine, combined with the cold and rains, is affecting the growth of all crops. Rain, 1.90.

Washington County (Greenwich).—Only one half day of sunshine. No haying nor harvesting for two weeks. Grass greatly damaged by the rains; half the rye out in shock, and is sprouting and straw turning. Early potatoes a light crop; late ones very promising. Rain, 2.03. Whitehall.—Very rainy and little hay secured. Many fields are getting over ripe. Corn now promises well.

Yates County (Penn Yan).—Rye will be better than wheat in this section; rain and hot sun doing damage; too much rain. Corn has greatly improved. Large crop of berries. Rain every day for fourteen days.

GENERAL REMARKS.

The heavy rains continued generally over the State until Saturday, 31st, when cooler and dryer weather set in. Haying and harvesting was consequently greatly delayed over the greater part of the State, rain having fallen almost every day for the past two weeks. A large part of the grain crop and probably a third of the grass it was impossible to cut during this time, and much that was cut remained out in the rains, resulting in great loss from moulding and sprouting. From almost all sections there are reports of wheat and rye sprouting and growing both in the shock and standing, and barley in many cases rendered totally unsalable.

Much of the standing grain has become over ripe, as is also the case with a large part of the standing timothy. The total damage to these crops is enormous. The Central Lake regions have suffered the least, while the eastern and southeastern sections, and the vicinities of Niagara and Cattaraugus counties, have sustained the greatest damage.

On the other hand all growing crops and pastures are usually in fine condition. Oats are about ready to cut; there is some complaint of rust and the fields are badly lodged, but the heads are well filled and the straw very good. Corn continues to make a splendid growth; early potatoes as a rule are blighted very badly, but late planted are greatly improved and generally promising. Beans, cabbages and all late garden truck are making a good growth. Hops and tobacco continue to improve. Excellent fall feed assured.

Slight change is apparent in the fruit prospects. Pears, plums and peaches continue very promising; blackberries and raspberries are abundant; grapes are growing finely. Apples in many sections continue to drop, but in some localities are very good.

In addition to the general damage caused by the heavy rains, considerable local loss has been sustained from severe hail and wind storms during the week.

The following is extracted from the national bulletin for the week ending with Monday, July 26th:

Corn has continued to make rapid growth in the States of the central valleys, Lake Region, New England and Middle Atlantic Coast. In Iowa the early crop has reached the earing stage, and there is ample moisture for present needs. In Nebraska it continues late, but is generally in excellent condition. In central and southern Kansas, corn has been seriously injured by hot winds

and drought, but over the remainder of the State it is in good condition. Drought is also causing serious injury to late corn in Texas and portions of Louisiana.

The week has not been favorable for completing winter-wheat harvest where unfinished in some of the more northerly sections.

Spring wheat has been injured by excessive rains in North Dakota, but in Minnesota, except on lowlands, and in South Dakota, the outlook is promising. In Washington and Oregon the crop is nearing maturity in excellent condition.

Except in Kentucky and portions of Tennessee, where the crop continues in poor condition, the general outlook for tobacco is encouraging. The crop has sustained damage by local storms in Ohio.

E. A. FUERTES,

Director.

R. M. HARDINGE,

Assistant Director.

SECTION IV.

Statistical Table of Stations—Description of
Stations.

STATISTICAL TABLE OF STATIONS ESTABLISHED BY OR REPORTING TO THE NEW YORK WEATHER BUREAU, FROM 1889 TO DATE.

COUNTY.	Station.	Name of observer.	LATITUDE.		LONGITUDE.		Elevation, feet.	Description, page.	Established.	Region.
			Degrees,	Minutes,	Degrees,	Minutes,				
Albany	Albany	U. S. Weather Bureau	42	40	73	45	85	.....	—, 1874	Hudson Valley.
Albany	Redbach Centre	L. H. Myers	42	31	73	48	.....	.....	May, 1890	Hudson Valley.
Albany	Cedar Hill	Schoonmaker & Son	42	32	73	46	.....	.....	June, 1897	Hudson Valley.
Albany	Water-vet Arsenal	Post Surgeon, U. S. A.	42	47	73	40	50	.....	—, 1824	Hudson Valley.
Allegany	Alfred	Prof. L. La Forge	42	15	77	55	1,824	383	—, 1889	Western Plateau.
Allegany	Angolica	E. I. Weaver	42	18	78	02	1,810	383	{ November, 1888,	Western Plateau.
Allegany	Bolivar	Dr. Dorr Cutler	42	04	78	12	.....	.....	{ April, 1890	Western Plateau.
Allegany	Canaseraga	H. J. Davis	42	28	77	50	1,275	.....	May, 1890	Western Plateau.
Allegany	Friendship	H. J. Davis	42	13	78	10	1,540	.....	March, 1897	Western Plateau.
Broome	Binghamton	State Hospital	42	07	75	35	870	.....	January, 1893	Western Plateau.
Broome	Binghamton	U. S. Weather Bureau	42	07	75	35	875	.....	October, 1889	Eastern Plateau.
Broome	Chenango Forks	Dr. Z. A. Spaulley	42	15	75	53	901	391	October, 1836	Eastern Plateau.
Broome	Niueval	W. J. Barnott	42	12	75	39	1,032	.....	May, 1897	Eastern Plateau.
Cattaraugus	Franklinville	J. W. Kales, M. D.	42	20	78	29	1,598	384	October, 1888	Eastern Plateau.
Cattaraugus	Humphrey	Charles E. Whitney	42	12	78	34	1,950	385	October, 1896	Western Plateau.
Cattaraugus	Little Valley	E. Sweetland	42	15	78	50	1,594	.....	—, 1885	Western Plateau.
Cattaraugus	Limestone	M. W. Wagner	42	02	78	40	1,416	.....	August, 1891	Western Plateau.
Cattaraugus	Napoli	Geo. A. Gladden	42	13	78	56	.....	.....	May, 1890	Western Plateau.
Cayuga	Auburn	A. H. Underwood	42	56	76	36	670	.....	September, 1897	Western Plateau.
Cayuga	Fleming	Robert Warwick	42	51	76	30	1,000	415	August, 1897	Central Lakes.
Cayuga	Sherwood	W. F. Scaring	42	45	76	40	.....	.....	December, 1889	Central Lakes.
Chautauqua	Alkwright	Miss E. L. Wilcox	42	25	79	15	1,260	386	May, 1894	Central Lakes.
Chautauqua	Cherry Creek	W. S. Blaisdell	42	18	79	07	.....	.....	August, 1890	Western Plateau.
Chautauqua	Dunkirk	Maxwell Scott	42	29	79	20	600	.....	May, 1890	Western Plateau.
Chautauqua	Jamestown	N. D. Lewis	42	06	79	16	1,321	.....	August, 1890	Great Lakes.
Chautauqua	Nashville	C. M. Libby	42	00	79	00	1,130	.....	November, 1895	Western Plateau.
Chautauqua	Sherman	Rev. Charles Simpson	42	10	79	37	1,570	.....	March, 1894	Western Plateau.
Chautauqua .....	.....	.....	.....	.....	.....	.....	.....	.....	November, 1889	Western Plateau.

Chautauque ..	Westfield ..	G. Schoenfeld ..	42	21	79	37	758	412	October, 1895 ..	Great Lakes.
Chemung ..	Elmira ..	Gerity Brothers ..	42	66	76	56	887	320	November, 1888 ..	Western Plateau.
Chemung ..	Pine City ..	Dr. H. M. Darling ..	42	62	76	54	.....	.....	May, 1890 ..	Western Plateau.
Chenango ..	Alton ..	A. C. Hyde ..	42	13	75	53	979	.....	May, 1890 ..	Eastern Plateau.
Chenango ..	Oxford ..	John P. Davis ..	42	23	73	40	1,000	392	December, 1889 ..	Eastern Plateau.
Clinton ..	Lyon Mountain ..	P. J. Mullin ..	44	41	73	57	1,917	.....	May, 1890 ..	Northern Plateau.
Clinton ..	West Chazy ..	W. H. Robinson ..	44	45	73	28	250	.....	May, 1890 ..	Northern Plateau.
Clinton ..	Plattsburgh ..	Prof. G. H. Hudson ..	44	42	73	27	150	.....	December, 1890 ..	Champlain Valley.
Clinton ..	Plattsburgh Barracks ..	Post Surgeon, U. S. A. ..	44	39	73	28	100	.....	—, 1839 ..	Champlain Valley.
Columbia ..	Lebanon Springs ..	Arthur K. Harrison ..	42	29	73	22	90	404	January, 1892 ..	Hudson Valley.
Cortland ..	Cortland ..	Prof. D. L. Bardwell ..	42	36	76	13	1,120	392	January, 1892 ..	Eastern Plateau.
Delaware ..	Bloomville ..	F. J. Campbell ..	42	20	74	40	1,500	.....	August, 1895 ..	Eastern Plateau.
Delaware ..	Deposit ..	M. R. Hulse ..	42	04	75	27	1,600	.....	May, 1890 ..	Eastern Plateau.
Delaware ..	South Kortright ..	D. C. Sharpe ..	42	20	74	43	1,700	392	—, 1888 ..	Eastern Plateau.
Dutchess ..	Honey-mead Brook ..	Dr. James Hyatt ..	41	51	73	42	405	.....	February, 1890 ..	Hudson Valley.
Dutchess ..	Pawling ..	Ira W. Hoag ..	41	32	73	35	.....	.....	April, 1890 ..	Hudson Valley.
Dutchess ..	Poughkeepsie ..	Vassar College ..	41	41	73	55	180	406	May, 1890 ..	Hudson Valley.
Dutchess ..	Wappingers Falls ..	H. C. Townsend ..	41	35	73	55	.....	.....	May, 1890 ..	Hudson Valley.
Erie ..	Eden Centre ..	W. P. Hunt ..	42	40	78	35	813	.....	December, 1889 ..	Great Lakes.
Erie ..	Arkon ..	H. A. Wilder ..	43	01	78	32	770	.....	May, 1890 ..	Western Plateau.
Erie ..	Buffalo ..	U. S. Weather Bureau ..	42	53	78	53	690	.....	—, 1870 ..	Great Lakes.
Erie ..	Fort Porter ..	Post Surgeon, U. S. A. ..	42	53	78	54	660	.....	January, 1849 ..	Great Lakes.
Essex ..	Ausable Forks ..	F. E. Trumbell ..	44	25	73	28	550	.....	May, 1890 ..	Northern Plateau.
Essex ..	Elizabethtown ..	M. B. Davis ..	44	12	73	41	600	.....	June, 1895 ..	Northern Plateau.
Essex ..	Kenne Valley ..	Rev. C. M. Perry ..	44	09	73	50	1,015	.....	November, 1897 ..	Northern Plateau.
Essex ..	Lake Placid ..	J. A. & G. A. Stevens ..	44	23	74	01	1,900	.....	July, 1897 ..	Northern Plateau.
Essex ..	Port Henry ..	C. W. Lansing ..	44	05	73	30	.....	.....	April, 1892 ..	Champlain Valley.
Essex ..	Tianderoga ..	D. M. Arnold, C. E. ..	43	51	72	25	.....	.....	July, 1897 ..	Champlain Valley.
Franklin ..	Amersand ..	Otto Ruhl ..	44	19	74	14	1,539	.....	December, 1888 ..	Northern Plateau.
Franklin ..	Hiawatha House (Axton) ..	Charles H. Wardner ..	44	13	74	18	.....	.....	November, 1892 ..	Northern Plateau.
Franklin ..	Malone ..	A. B. Johnson ..	44	50	74	18	810	.....	November, 1890 ..	St. Lawrence Valley.
Franklin ..	Saratoga Lake ..	E. R. Baldwin, M. D. ..	44	03	74	19	1,530	400	November, 1893 ..	Northern Plateau.
Fulton ..	Gloversville ..	L. W. Chamberlain ..	43	03	74	22	802	400	.....	Northern Plateau.
Genesee ..	Alabama ..	S. S. Parker ..	43	04	78	33	648	.....	April, 1890 ..	Western Plateau.
Genesee ..	Baravia ..	N. Bogue ..	43	00	78	18	900	.....	May, 1890 ..	Western Plateau.
Genesee ..	La Roy ..	W. E. Annin ..	42	58	78	02	870	.....	.....	Western Plateau.
Greene ..	Catskill ..	A. D. Wilbur ..	42	13	73	52	450	.....	June, 1896 ..	Hudson Valley.
Greene ..	Tannersville ..	H. M. Wilson ..	42	00	74	07	1,900	.....	February, 1889 ..	Eastern Plateau.

STATISTICAL TABLE OF STATIONS ESTABLISHED, ETC., FROM 1886 TO DATE — (Continued).

COUNTY.	Station.	Name of observer.	LATITUDE.		LONGITUDE.		Elevation, feet.	Description page.	Established.	Region.
			Degrees.	Minutes.	Degrees.	Minutes.				
Herkimer.....	Biaby Lodge.....	Henry Studer.....	43	33	75	00	1,800	.....	May, 1892	Northern Plateau.
Herkimer.....	Ilion.....	G. A. Trowbridge.....	43	00	75	04	480	.....	October, 1888	Mohawk Valley.
Herkimer.....	Little Falls (20).....	.....	43	12	74	48	1,526	.....	December, 1896	Northern Plateau.
Herkimer.....	Little Falls (16).....	S. E. Babcock, C. E.....	43	03	74	52	924	.....	December, 1896	Mohawk Valley.
Jefferson.....	Adams Falls.....	A. B. Cooley.....	43	54	70	01	619	.....	May, 1890	Great Lakes.
Jefferson.....	Alexandria Bay.....	George Douglass Miller.....	44	19	75	52	240	.....	August, 1897	St. Lawrence Valley.
Jefferson.....	Carthage.....	Rev. R. J. Thompson.....	43	58	75	37	740	.....	February, 1893	Northern Plateau.
Jefferson.....	Madison Barracks.....	Post Surgeon, U. S. A.....	43	56	76	06	266	.....	.....	St. Lawrence Valley.
Jefferson.....	Watertown.....	Frank M. Porter.....	43	57	75	54	486	408	October, 1890	St. Lawrence Valley.
Kings.....	Brooklyn.....	Prof. W. C. Peckham.....	40	41	73	59	107	.....	.....	Coast Region.
Kings.....	Fort Hamilton.....	Post Surgeon, U. S. A.....	40	37	74	02	25	.....	.....	Coast Region.
Kings.....	Manhattan Beach.....	H. B. Findley.....	40	34	73	57	40	.....	January, 1895	Coast Region.
Lewis.....	Constableville.....	Charles E. Taylor.....	43	32	73	27	1,246	.....	November, 1888	Northern Plateau.
Lewis.....	Lonsville.....	Charles S. Rice.....	43	47	73	30	900	401	May, 1890	Northern Plateau.
Lewis.....	Number Four (Fenton's).....	Charles Fenton.....	43	50	75	12	1,571	402	{ December, 1888..... } { December, 1889..... }	Northern Plateau.
Lewis.....	Turin.....	R. T. Church.....	43	38	75	25	1,240	.....	October, 1890	Northern Plateau.
Livingston.....	Avon.....	W. G. Markham.....	42	55	77	47	585	387	{ May, 1890..... } { August, 1895..... }	Western Plateau.
Livingston.....	Mt. Morris.....	M. B. McNair.....	42	42	77	56	525	388	June, 1890	Western Plateau.
Livingston.....	Nunda.....	Prof. John P. Slocum.....	42	53	77	59	1,336	.....	August, 1897	Western Plateau.
Madison.....	Bouckville.....	L. W. Griswold.....	42	53	75	34	1,350	.....	July, 1897	Eastern Plateau.
Madison.....	Brookfield.....	D. B. Stillman.....	42	48	75	20	1,350	.....	December, 1889	Eastern Plateau.
Madison.....	Chittenango.....	F. H. Gates.....	43	04	75	54	.....	.....	May, 1890	Great Lakes.
Madison.....	Hamilton.....	Prof. W. F. Langworthy.....	42	49	75	35	1,127	.....	June, 1894	Eastern Plateau.
Monroe.....	Brookport.....	F. A. Winuo, M. D.....	43	13	77	58	520	.....	February, 1890	Great Lakes.
Monroe.....	Pittsford.....	Rev. G. H. Gompb.....	43	05	77	34	515	412	June, 1895	Great Lakes.

Monroe	Rochester	U. S. Weather Bureau	43	08	77	42	621	—, 1870	Great Lakes
Monroe	Scottsville	Miss Florence Budlong	43	01	77	48	—	May, 1890	Great Lakes
Montgomery	Canajoharie	Prof. C. M. Bean	42	53	74	34	300	December, 1896	Mohawk Valley
Montgomery	St. Johnsville	E. G. Storms	43	02	74	43	810	October, 1896	Mohawk Valley
New York	Central Park	Daniel Draper, Ph. D.	40	46	73	58	97	—, 1868	Coast Region.
New York	Port Columbus	Post Surgeon, U. S. A.	40	42	74	01	23	—, 1821	Coast Region.
New York	New York city	U. S. Weather Bureau	40	43	74	00	314	—, 1870	Coast Region.
Niagara	Port Niagara	Post Surgeon, U. S. A.	43	16	70	05	263	—, 1829	Great Lakes.
Niagara	Appleton	H. A. Van Wagoner	43	20	78	41	330	August, 1889	Great Lakes.
Niagara	Lockport	Chas. H. Cornes, C. E.	43	10	78	—	600	April, 1891	Western Plateau.
Niagara	Newfane	F. B. Clarke	43	17	78	45	—	January, 1889	Great Lakes.
Niagara	Niagara Falls	Geo. W. Whitney	43	05	79	05	574	July, 1896	Great Lakes.
Niagara	Pendleton Centre	W. D. Lovell	43	06	78	48	580	December, 1889	Great Lakes.
Niagara	Somerseset	W. B. Thurber	43	21	78	35	—	—	Great Lakes.
Oneida	Booneville	Byron Hughes	43	28	75	21	1,135	May, 1893	Northern Plateau.
Oneida	Rensselaer	D. S. Davies	43	18	75	13	1,185	August, 1895	Northern Plateau.
Oneida	Rome	H. C. Sutton, M. D.	43	11	75	28	445	October, 1890	Mohawk Valley.
Oneida	Utica	Masonic Home	43	05	75	13	537	—, 1879	Mohawk Valley.
Oneida	West Camden	W. H. Gifford	43	21	75	51	—	May, 1890	Great Lakes.
Onondaga	Apulia	W. H. Tibbett	42	48	76	05	1,227	May, 1890	Eastern Plateau.
Onondaga	Baldwinsville	S. C. Suydam	43	11	76	21	390	December, 1890	Great Lakes.
Onondaga	Fayetteville	E. L. Parker	42	01	76	02	538	August, 1897	Eastern Plateau.
Onondaga	Pompey	Prof. T. H. Armstrong	42	53	76	03	1,720	September, 1890	Eastern Plateau.
Onondaga	Skauteles	Edward Conron	42	56	76	27	950	August, 1892	Great Lakes.
Onondaga	Syracuse	D. McCarthy & Co.	43	03	76	11	509	August, 1895	Great Lakes.
Ontario	Geneva	Mrs. N. S. Yates	42	51	76	59	459	December, 1888	Central Lakes.
Ontario	Victor	M. F. Webster	42	59	77	26	650	July, 1891	Western Plateau.
Orange	Middletown	State Hospital	41	25	74	25	660	January, 1890	Eastern Plateau.
Orange	Port Jervis	Prof. John M. Dolph	41	21	74	40	470	November, 1889	Eastern Plateau.
Orange	Warwick	John W. Sly	41	14	74	21	502	May, 1890	Eastern Plateau.
Orange	West Point	Post Surgeon, U. S. A.	41	24	73	57	167	—, 1824	Hudson Valley.
Orleans	Albion	Prof. F. A. Greene	43	14	78	13	547	May, 1891	Great Lakes.
Orleans	Kendall	R. N. Hunt	43	20	78	04	—	November, 1889	Great Lakes.
Orleans	Lyndonville	Frank Plummer	43	27	78	25	—	May, 1890	Great Lakes.
Orleans	Ridgeway	M. E. Weld	43	16	78	25	—	June, 1895	Great Lakes.
Orleans	West Kendall	J. H. Derrick	43	20	78	06	—	June, 1894	Great Lakes.
Oswego	Denstar	F. W. Squires	43	17	76	20	—	May, 1890	Great Lakes.
Oswego	Fullton	Prof. B. G. Clapp	43	18	76	26	387	November, 1894	Great Lakes.
Oswego	Oswego	U. S. Weather Bureau	43	29	76	35	304	—, 1871	Great Lakes.
Oswego	Palermo	E. B. Bartlett	43	24	76	20	460	July, 1887	Great Lakes.

STATISTICAL TABLE OF STATIONS ESTABLISHED, ETC., FROM 1889 TO DATE.—(Continued).

COUNTY.	Station.	Name of observer.	LATITUDE.		LONGITUDE.		Elevation, feet.	Description, page.	Established.	Region.
			Degrees.	Minutes.	Degrees.	Minutes.				
Oswego.....	Phoenix.....	C. J. Fuller.....	43	13	76	20	.....	.....	October, 1892	Great Lakes.
Oswego.....	Sand Bank.....	L. W. Bennett.....	43	27	76	01	.....	.....	May, 1890.....	Great Lakes.
Oswego.....	Cooperstown.....	G. Pomeroy Reese.....	42	41	74	57	1,300	395	..... 1842, 1853.	Eastern Plateau.
Oswego.....	Garrettsville.....	F. J. Campbell.....	42	39	73	12	1,364	393	January, 1897.	Eastern Plateau.
Oswego.....	New Lisbon.....	G. A. Yates.....	42	35	75	13	1,334	396	November, 1892	Eastern Plateau.
Otsego.....	Otsego.....	Ford & Ford.....	42	22	75	06	1,090	395	August, 1891	Eastern Plateau.
Otsego.....	Schenectady.....	C. J. Tipple.....	42	33	74	50	1,272	.....	June, 1897	Eastern Plateau.
Putnam.....	Ardenia.....	Rev. R. B. Arden.....	41	24	73	56	157	.....	—, 1856	Hudson Valley.
Putnam.....	Boyd's Corners.....	.....	41	29	73	43	546	.....	.....	Hudson Valley.
Putnam.....	Carmel.....	Thomas Manning.....	41	25	73	40	500	405	.....	Hudson Valley.
Putnam.....	Southeast Reservoir.....	.....	.....	.....	.....	.....	.....	.....	.....	Hudson Valley.
Queens.....	Willett's Point.....	Post Surgeon, U. S. A.....	40	38	73	48	.....	.....	.....	Coast Region.
Rensselaer.....	Eagle Mills.....	M. Weatherwax.....	42	41	73	34	.....	.....	August, 1894	Hudson Valley.
Rensselaer.....	Stephentown.....	R. A. Holcomb.....	42	30	73	30	1,000	.....	September, 1899.	Hudson Valley.
Rensselaer.....	Schohaek Depot.....	P. B. Burton.....	42	34	73	43	298	.....	May, 1890.....	Hudson Valley.
Richmond.....	Fort Wadsworth.....	Post Surgeon, U. S. A.....	40	35	74	01	.....	.....	.....	Coast Region.
St. Lawrence.....	Carlton.....	C. W. Blom.....	44	35	75	12	304	410	November, 1889.	St. Lawrence Valley.
St. Lawrence.....	De Kalb Junction.....	C. A. Halligas.....	44	29	75	16	300	.....	May, 1899.	St. Lawrence Valley.
St. Lawrence.....	Massena.....	A. J. Nelson.....	44	55	77	54	.....	.....	April, 1890	St. Lawrence Valley.
St. Lawrence.....	North Hammond.....	C. A. Wooster.....	44	30	75	40	340	409	.....	St. Lawrence Valley.
St. Lawrence.....	Norwood.....	R. A. Whitney.....	44	38	75	00	.....	.....	May, 1890	St. Lawrence Valley.
St. Lawrence.....	Ogdensburg.....	State Hospital.....	44	43	75	30	258	111	January, 1899.	St. Lawrence Valley.
St. Lawrence.....	Potsdam.....	G. W. F. Smith.....	44	40	75	01	300	410	December, 1889.	St. Lawrence Valley.
Saratoga.....	Galway.....	J. P. Cronch.....	43	01	74	03	.....	.....	June, 1899.	Northern Plateau.
Saratoga.....	Kings Station.....	R. E. Cronk-lite.....	43	10	73	47	588	.....	May, 1890	Northern Plateau.
Saratoga.....	Stillwater.....	Rev. R. J. Thompson.....	42	57	73	40	110	.....	May, 1893.	Hudson Valley.
Saratoga.....	Saratoga.....	W. H. Hall, M. D.....	42	05	73	48	270	407	October, 1890	Champlain Valley.
Schenectady.....	Quaker Street.....	William Weaver.....	42	44	71	12	973	.....	November, 1889.	Eastern Plateau.
Schenectady.....	Schenectady.....	Prof. Arthur Marvin.....	42	49	73	57	216	.....	December, 1897.	Mohawk Valley.
Scholarie.....	Hyndsville.....	C. P. Bouton.....	42	40	74	35	1,162	.....	June, 1890.	Eastern Plateau.

Schoharie.....	Middleburgh.....	F. X. Straub.....	42	30	74	29	648	July, 1898.....	Eastern Plateau.
Schoharie.....	Perry City.....	W. H. Jeffers.....	42	33	76	44	1,038	December, 1889.....	Eastern Plateau.
Schoharie.....	Tyone.....	A. C. Weller.....	42	24	77	05	.....	June, 1895.....	Western Plateau.
Schoharie.....	Watkins.....	Sautarian.....	42	22	76	55	600	February, 1892.....	Central Lakes.
Schoharie.....	Wedgewood.....	O. F. Corwin.....	42	25	76	56	1,350	December, 1889.....	Western Plateau.
Schoharie.....	Romulus.....	J. H. Coryell.....	42	43	76	57	719	August, 1891.....	Central Lakes.
Steuben.....	Addison.....	H. R. Ainsworth.....	42	07	77	16	1,000	December, 1890.....	Western Plateau.
Steuben.....	Atlanta.....	F. D. Crouch.....	42	36	77	31	1,325	May, 1890.....	Western Plateau.
Steuben.....	Corning.....	Dr. H. M. Darling.....	42	08	76	05	942	June 1899.....	Central Lakes.
Steuben.....	Hammidsport.....	H. O. Fairchild.....	42	25	77	09	800	June, 1895.....	Western Plateau.
Steuben.....	Haskinsville.....	W. G. Collins.....	42	25	77	36	.....	.....	.....
Steuben.....	Savona.....	M. S. Collier, M. D.....	42	17	77	15	1,053	November, 1889.....	Western Plateau.
Steuben.....	South Canisteo.....	James E. Wilson.....	42	12	77	34	1,480	February, 1891.....	Coast Region.
Suffolk.....	Brentwood.....	W. H. Ross, M. D.....	40	46	73	14	75	.....	Coast Region.
Suffolk.....	East Hampton.....	J. F. Bell, M. D.....	40	58	72	11	16	January, 1890.....	Coast Region.
Suffolk.....	Setauket.....	Selah B. Strong.....	40	57	73	05	40	....., 1885.....	.....
Sullivan.....	Liberty.....	Dr. Edward Stubbart.....	41	46	74	46	1,467	May, 1890.....	Eastern Plateau.
Tioga.....	Apalachin.....	Frank B. Tracy.....	42	04	76	10	822	....., 1889.....	Eastern Plateau.
Tioga.....	Newark Valley.....	M. D. Chuton.....	42	14	76	12	966	May, 1890.....	Eastern Plateau.
Tioga.....	Nicholas.....	F. C. Lowman.....	42	01	76	21	800	May, 1890.....	Eastern Plateau.
Tioga.....	Straits Corners.....	Wm. E. Elmendorf.....	42	09	76	25	.....	October, 1896.....	Eastern Plateau.
Tioga.....	Waverly.....	T. P. Yates.....	42	01	76	34	825	January, 1882.....	Eastern Plateau.
Tompkins.....	Caroline.....	J. W. Reed.....	42	20	76	20	.....	February, 1894.....	Eastern Plateau.
Tompkins.....	Dryden.....	J. Giles Ford.....	42	29	76	14	1,079	July, 1896.....	Eastern Plateau.
Tompkins.....	Ellis.....	Oscar Snyder.....	42	26	76	25	.....	November, 1892.....	Eastern Plateau.
Tompkins.....	Ithaca.....	College of Civil Engineering.....	42	27	76	29	810	....., 1874.....	Central Lakes.
Tompkins.....	McLean.....	Newton Baldwin.....	42	35	76	19	1,000	May, 1890.....	Eastern Plateau.
Tompkins.....	Newfield Summit.....	Luther Leonard.....	42	23	76	40	2,000	October, 1892.....	Eastern Plateau.
Tompkins.....	Trumansburgh.....	Loren P. Smith.....	42	32	76	40	800	May, 1891.....	Central Lakes.
Ulster.....	Marlborough.....	E. E. McNamee.....	41	37	73	59	300	July, 1890.....	Hudson Valley.
Ulster.....	Minnewaska.....	E. A. Smiley.....	41	44	74	14	1,800	November, 1889.....	Eastern Plateau.
Ulster.....	Molok Lake.....	A. K. Smiley.....	41	47	74	10	1,235	November, 1895.....	Eastern Plateau.
Ulster.....	Rondout.....	H. A. Stone.....	41	55	73	58	150	November, 1883.....	Hudson Valley.
Warren.....	Glens Falls.....	Prof. C. L. Williams.....	43	19	73	41	340	October, 1891.....	Champlain Valley.
Warren.....	Lake George.....	Galloway C. Morris.....	43	26	73	43	370	October, 1896.....	Champlain Valley.
Warren.....	Queensbury.....	DeWitt C. Jenkins.....	43	25	73	40	500	November, 1888.....	Champlain Valley.
Washington.....	Easton.....	H. Tabor.....	43	00	73	35	.....	May, 1890.....	Hudson Valley.
Washington.....	Greenwich.....	Oscar W. Tefft.....	43	06	73	32	.....	August, 1897.....	Hudson Valley.
Washington.....	Whitehall.....	Prof. W. W. Howe.....	43	33	73	24	115	January, 1892.....	Champlain Valley.
Wayne.....	Lyons.....	W. H. Veeder.....	43	06	77	00	407	....., 1889.....	Great Lakes.

STATISTICAL TABLE OF STATIONS ESTABLISHED, ETC., FROM 1889 TO DATE — (Concluded).

COUNTY.	Station.	Name of observer.	LATITUDE.		LONGITUDE.		Elevation, feet.	Description, page.	Established.	Region.
			Degrees.	Minutes.	Degrees.	Minutes.				
Wayne.....	Palmyra.....	L. D. Cummings.....	43	05	77	09	740	.....	.....	Great Lakes.
Wayne.....	Rose.....	George Smart.....	43	09	76	55	.....	.....	April, 1895.....	Great Lakes.
Westchester ..	Bedford.....	W. A. Hyde.....	41	12	73	38	75	403	November, 1893.....	Coast Region.
Westchester ..	David's Island ..	Post Surgeon, U. S. A.....	40	52	73	46	.....	.....	.....	Coast Region.
Westchester ..	Peekskill.....	John N. Tilden, M. D.....	41	17	73	55	250	342	November, 1889.....	Hudson Valley.
Westchester ..	Primrose.....	W. A. Cornelious.....	40	57	73	50	200	.....	October, 1896.....	Coast Region.
Westchester ..	White Plains ..	Prof. O. R. Willis.....	41	05	73	40	253	.....	—, 1854.....	Coast Region.
Wyoming.....	Arcade.....	J. D. Tate.....	42	32	78	26	1,577	396	April, 1890.....	Western Plateau.
Wyoming.....	Atona.....	H. T. Bramer.....	42	50	78	19	1,000	.....	May, 1890.....	Western Plateau.
Wyoming.....	Castle.....	W. B. Pratt.....	42	47	78	05	1,400	.....	February, 1893.....	Western Plateau.
Wyoming.....	Varysburg.....	H. C. Orr.....	42	45	78	20	.....	.....	April, 1892.....	Western Plateau.
Yates.....	Italy Hill.....	Mrs. J. Pulver.....	42	39	77	17	2,080	.....	July, 1890.....	Western Plateau.
Yates.....	Penn Yan.....	R. L. Eastman.....	42	39	77	05	756	.....	April, 1892.....	Central Lakes.
Erie, Pa.....	Erie.....	U. S. Weather Bureau.....	42	07	80	05	681	.....	—, 1873.....	Great Lakes.

Description of Stations.

WESTERN PLATEAU — ALLEGANY COUNTY.

STATION, ALFRED — IN CHARGE OF MR. LAURENCE LA FORGE AT ALFRED UNIVERSITY.

Established in 1889; latitude, 42 deg. 15 min. north; longitude, 77 deg. 55 min. west; elevation, 1,824 feet.

The town of Alfred is situated near the upper limit of a valley which opens, in a northeasterly direction, toward the Alfred station of the New York, Lake Erie and Western Railroad, 2 miles distant. The station is located in the town, half-way up the eastern slope of the valley, on both sides of which the hills rise to the heights of from 100 to 200 feet.

A standard Green barometer is hung in a room (heated in winter) on the second floor of a house on Park street. The maximum, minimum, wet and dry thermometers, with a thermograph, are located in a louvered shelter of a pattern of the United States Weather Bureau standard. The shelter is 7 feet above the ground, and 35 feet from any buildings.

The rain-guage is 28 inches above the ground, and 30 feet from buildings.

The station has been very recently completely equipped with an anemograph and anemometer, a thermograph and a sunshine recorder, also soil thermometers; and systematic observations for the determination of the climate of the locality are being made.

WESTERN PLATEAU — ALLEGANY COUNTY.

STATION, ANGELICA — MR. EVERETT I. WEAVER, OBSERVER.

Established (by signal service), November, 1889; equipped by State service, April, 1890; latitude, 42 deg. 18 min. north; longitude, 78 deg. 2 min. west; elevation, 1,340 feet.

This station is located at the Wilson academy, near the center of the main street of Angelica. It is nearly surrounded by high hills, which, toward the north, rise abruptly at a distance of a

few hundred feet from the station; while toward the southwest the main valley extends for over a mile to the foot of the ridge in that direction. A deep and narrow valley opens toward the north through the hills near the station.

The thermometers are exposed in a window shelter built on the north side of an unheated wing of the academy. The bottom of the shelter (which is closed) is 11 feet above the sod. Its height is 5 feet, depth 2 feet, and width about 3 feet. Both front and sides are louvered, and its top is slanting. The thermometers are mounted near the center of the shelter and are read from the window which is kept closed).

The rain-gauge is in an open field, well removed from any obstacles to a free air circulation. The height of the top of the gauge, above the ground, is 3 feet.

This station was in the charge of Prof. J. P. Slocum until the summer of 1897, when the transfer to Mr. Weaver was made.

WESTERN PLATEAU — CATTARAUGUS COUNTY.

STATION, FRANKLINVILLE — JOHN W. KALES, M. D., OBSERVER.

Established in October, 1896; latitude, 42 deg. 20 min.; longitude, 78 deg. 29 min.; elevation, 1,598 feet.

Franklinville is situated in a valley about $1\frac{1}{4}$ miles wide, hills rising on the east and west sides to heights of 500 and 300 feet, respectively.

Maximum and minimum thermometers are placed in a shelter of the standard Weather Bureau pattern, located to secure a good air circulation, and which is also exposed to the sun's rays. The bottom of the shelter is 6 feet above the sod. There is no building within 20 feet of the shelter.

The rain-gauge has an open exposure. Its top is $2\frac{1}{2}$ feet above the ground.

WESTERN PLATEAU — CATTARAUGUS COUNTY.

STATION, HUMPHREY — MR. CHARLES E. WHITNEY, OBSERVER.

Equipped (by Signal Service) 1885-1886; latitude, 42 deg. 12 min. north; longitude, 78 deg. 34 min. west; elevation, 1,950 feet, as determined by aneroid readings; no data have been previously obtainable, and consequently the height given in the report of 1889 is very much in error.

The station is about 10 miles northeast of the Great Valley station of the New York, Lake Erie and Western railroad. It is near the summit of a ridge of hills, 350 feet above, and on the northwest side of a stream which flows into the Allegany River at Great Valley station. The hills in this section rise to an average height of 1,900 or 2,000 feet above tide, and are intersected by numerous deep valleys.

Mr. Whitney's station is situated between two knolls, toward the east and west respectively, whose summits are from 50 to 80 feet above the station.

The dry and wet bulb and the maximum and minimum thermometers are placed under the roof of a piazza facing toward the south, in an angle formed by the main portion of the house and a wing on the eastern side. The height of the thermometers above the ground is about 7 feet; above the floor of the piazza, $5\frac{1}{2}$ feet, and below its roof, 3 feet. The width of the piazza is 4 feet. The thermometers are hung several inches away from the wall of the building.

The rain-gauge is situated about 45 feet north-northwest of the main portion of the house. Two or three dwarf fruit trees are at a distance of 12 or 15 feet, and are the only obstacles to a free circulation of air in the vicinity. The top of the gauge is 4 feet above the ground.

An anemometer placed at this station is mounted on the south gable of the house, 7 feet above the ridge and about 30 feet above the ground.

WESTERN PLATEAU — CHAUTAUQUA COUNTY.

STATION, ARKWRIGHT — MISS ETTA L. WILCOX, OBSERVER.

Established in August, 1899; special temperature station; latitude, 42 deg. 25 min. north; longitude, 79 deg. 15 min. west; elevation, 1,360 feet.

This station is situated about 6 miles east-southeast of Dunkirk, on the range of hills which borders the shore of Lake Erie. The writer's observations of an aneroid barometer give the elevation of this station as approximately 685 feet above the level of Lake Erie. The thermograph is located at the house of Mr. E. I. Wilcox, which stands on the northern slope of a ridge rising above the general level of the hills to a height of 200 or 300 feet, half a mile in the rear of the station. The ground falls away from Mr. Wilcox's house toward the north and west, so that there is an unobstructed view toward Buffalo plains and over Lake Erie. The station is somewhat sheltered from the south winds by the ridge mentioned, but air currents from all other directions have a free circulation about it. The shelter of the Draper thermograph is placed at the eastern end of a northern piazza, at a height of $4\frac{1}{2}$ feet above the floor and 7 feet from the ground. The eastern and western ends of the piazza are formed by wings projecting about 7 feet from the body of the house; the thermograph being placed about 1 foot distant from the outer side of the piazza. The rays of the sun are excluded from the shelter and its vicinity at all times, excepting possibly for an hour in the late afternoons of summer.

WESTERN PLATEAU — CHAUTAUQUA COUNTY.

STATION, JAMESTOWN — MR. N. D. LEWIS, OBSERVER.

Established in November, 1895; latitude, 42 deg. 06 min. north; longitude, 79 deg. 16 min. west; elevation, 1,321 feet.

This station is situated in the city of Jamestown, on the crest of a hill extending in an easterly and westerly direction. The surrounding country is hilly, mainly a moraine formation, intersected by short valleys.

Maximum and minimum thermometers are exposed on the eastern side of the house, at a height of 15 feet from the ground, and are protected by a piazza roof. They are exposed to the sun's rays only at sunrise in mid-winter.

The rain-gauge stands on a level surface, and is 15 to 20 feet from the nearest tree or buildings. Its top is 9 feet above the ground.

WESTERN PLATEAU — CHEMUNG COUNTY.

STATION, ELMIRA — MESSRS. W. S. & C. R. GERITY, OBSERVERS.

Established November, 1888; latitude, 42 deg. 06 min. north; longitude, 76 deg. 56 min. west; elevation, 863 feet.

The city of Elmira is located upon the broad valley bottom of the Chemung river, at its point of intersection with a deep depression extending northward from Pennsylvania to the valley of Seneca lake. Beyond the city limits the hills rise abruptly from the flat lands to the higher levels of the Western Plateau.

The meteorological station is located near the center of the city at the business house of Messrs. Gerity, on the southeast corner of Lake and Carrol streets. The thermometer shelter projects from a window on the north-northwest side and second story of the brick building. Its dimensions are approximately 3 feet in width, 2 feet in depth and 3 feet in height, the thermometers being secured near its center at a distance of 18 inches from the window, which is always closed. The sides and front of the shelter are closed, the provision for ventilation consisting of an open bottom and air spaces between the top and sides. The thermometers are 18 feet above the pavement.

WESTERN PLATEAU — LIVINGSTON COUNTY.

STATION, AVON — MR. W. G. MARKHAM, OBSERVER.

Established in August, 1895; latitude, 42 deg. 55 min. north; longitude, 77 deg. 47 min. west; elevation, 585 feet.

This station is located in open country of the Genesee Valley bottom, 23 miles south of Lake Ontario, and is about 100 rods east of the Genesee river and 25 feet above its highest level. At high

water the valley is carried over an area $1\frac{1}{2}$ miles in breadth. The surface is gently undulating to the east, while westward, hills rise to a considerable elevation. The valley is broad and open toward the south.

Maximum and minimum thermometers are attached to the north end of a building, their height above the ground being 5 feet. They are protected by a hood 6 inches deep, open toward the north, and the rays of the sun are excluded at all hours.

The rain-gauge is mounted upon a post, its top being 4 feet 8 inches above the ground. The surface near by is quite level, and the gauge is at an ample distance from obstructions to free-air circulation.

WESTERN PLATEAU — LIVINGSTON COUNTY.

STATION, MOUNT MORRIS — MR. J. KNAPPENBERG, OBSERVER.

Established June, 1890; latitude, 42 deg. 42 min. north; longitude, 77 deg. 56 min. west; elevation, 525 feet (approximately).

Mt. Morris is situated in the valley bottom, on the borders of Dansville creek. The course of the stream in this vicinity is toward the north, hills of moderate elevation rising on the eastern and western sides. The general surface of the neighboring country slopes rapidly from the high hills, further south, toward the plains of the Great Lake region.

The maximum and minimum thermometers are exposed on the north side of Mr. Knappenberg's barn, and are said to be sheltered from sunlight at all hours, and also from moisture. The rain-gauge stands freely exposed in the yard.

WESTERN PLATEAU — SCHUYLER COUNTY.

STATION, WEDGEWOOD — MR. O. F. CORWIN, OBSERVER.

Equipped with standard instruments in December, 1889; latitude, 42 deg. 25 min. north; longitude, 76 deg. 56 min. west; elevation, 1,350 feet.

This station is situated on the high hills which rise abruptly from the valley of Seneca lake, and is about three-quarters of a mile west of Wedgewood depot of the Fall Brook Coal Company's

railroad. The ground rises gradually to the west and south of Mr. Corwin's house, where the instruments are located, but slopes away from it in all other directions. The temperature and rainfall at this station should fairly represent the climatic features of the highlands near the central lakes.

The thermometer shelter is about 30 feet west of the house, and is supported on posts at a height of 4 feet above the sod. Its dimensions are about $3\frac{1}{2}$ by $2\frac{1}{2}$ feet at the base and 3 feet in height. The sides are of board (unpainted), with a door of the width of the shelter on the east side. Ventilation is obtained by spaces about one-eighth of an inch in width between the boards, and by a large number of holes bored in the sides at such an angle that rain is excluded. The top double, with an air space, and has a slight slope. The thermometers are hung near the center of the shelter. The rain-gauge is placed on a post $4\frac{1}{2}$ feet above the ground, that it may be above snow-drifts. The only obstacles to a free circulation of air in the vicinity of the gauge is a hedge of shrubs 20 feet distant and about 12 feet in height.

WESTERN PLATEAU — STEUBEN COUNTY.

STATION, ADDISON — DR. H. R. AINSWORTH, OBSERVER.

Established, December, 1890; latitude, 42 deg. 07 min.; longitude, 77 deg. 16 min.; elevation, 1,000 feet.

This station is situated in the village of Addison, in the valley of the Canisteo river. Mr. Ainsworth's house is about 500 feet distant from, and 45 feet above, the river. Hills rise to a considerable altitude on both the north and south sides of the valley.

Dry and wet, maximum and minimum thermometers are exposed under the roof of a broad piazza, having a frontage toward the east and north.

A standard rain-gauge is located 75 feet distant from the house and 40 feet from a barn. Its top is 4 feet 6 inches above the ground.

WESTERN PLATEAU — STEUBEN COUNTY.

STATION, SOUTH CANISTEO — MR. JAMES E. WILSON, OBSERVER.

Equipped November, 1889; latitude, 42 deg. 12 min. north; longitude, 77 deg. 34 min. west; elevation, 1,480 feet.

This station is situated in the valley of a creek, 5 miles south-southeast of the town of Canisteo. The hills rise abruptly from the valley at distances ranging from 100 to 200 feet on the eastern and western sides of the station. The high ridges of the surrounding country are separated by deep valleys similar to the one in which the station is located, opening northward toward the Canisteo river. The highest point in the neighborhood is the "Swale," about 3 miles east of the station.

The dry and wet and the maximum and minimum thermometers are exposed under a piazza of Mr. Wilson's house, 5 feet in width and facing the northeast. The thermometers are secured to a window of the house with air space between. Canvas is spread along the front of the piazza to exclude the rays of the morning sun from the instruments and also from the piazza floor. The thermometers are 5 feet above the ground.

The rain-gauge is 20 feet distant from the nearest building 10 or 12 feet in height, and about as far from a few small fruit trees. The height of the top of the gauge above the ground is 2 feet.

WESTERN PLATEAU — WYOMING COUNTY.

STATION, ARCADE — MR. J. D. TATE, OBSERVER.

Established April, 1890; latitude, 42 deg. 32 min. north; longitude, 78 deg. 26 min. west; elevation, 1,707 feet.

This station is located near the eastern side of a ridge of hills which lie west of a valley extending from Arcade to Sandusky. The village of Arcade is about 2 miles west-northwest of the station. Toward the north the ground slopes gently from the station to the valley bottom, 140 feet below; while toward the west and southwest the ridge rises to a height of 100 to 200 feet above the station. The surrounding country is very hilly, some of the higher summits reaching an elevation of more than 2,000 feet above tide.

The dry and wet bulb, maximum and minimum thermometers are exposed out of the north window of an unheated one-story wing of Mr. Tate's house. The sides of the shelter are the window blinds, which are secured in a position at right angles to the wall of the house by a wide board forming the top of the shelter. The thermometers are 9 feet above the ground, and facing outward, are reached by steps. The front of the shelter is open, while a wide board at the bottom cuts off radiation from the ground.

The rain-gauge is about 40 feet northwest of the house. There are no trees or other obstructions to a free air circulation in its vicinity. The top of the gauge is 26 inches above the ground.

EASTERN PLATEAU — BROOME COUNTY.

STATION, BINGHAMTON — SUPERINTENDENT OF STATE HOSPITAL;

MR. J. J. EASTMAN, OBSERVER.

Established (by Signal Service) October, 1889; latitude, 42 deg. 07 min. north; longitude, 75 deg. 55 min. west; elevation, 870 feet.

The instruments are located on the grounds of the pumping station of the State hospital water-works, on the northern bank of the Susquehanna river. North of the station the ground rises abruptly to the hospital grounds, over 200 feet above, and beyond the hospital the ground continues to rise to a much greater elevation. The station is at the outskirts of the city of Binghamton, which lies on the broad plain toward the south and west.

The dry bulb and maximum and minimum thermometers are exposed in a louvred shelter, built after the signal service specifications, and is supported at the height of 12 feet from the ground on a skeleton platform. It is 90 feet west of the pumping station, 100 feet north of the river bank, and about 30 feet above mean water level of the river.

The rain-gauge is 90 feet west of the water-works, and there are no obstructions nearer than this to interfere with a free air circulation. The top of the gauge is 8 feet above the ground.

EASTERN PLATEAU — CHENANGO COUNTY.

STATION, OXFORD — MR. JOHN P. DAVIS, OBSERVER.

Latitude, 42 deg. 26 min. north; longitude, 75 deg. 40 min. west; elevation, 1,000 feet; location changed to Oxford village in 1893.

This station is located at Mr. Davis' residence in the town of Oxford, on the western side of the Chenango river valley; the surface being nearly level in the vicinity of the station.

The maximum and minimum thermometers are secured 6 feet above the sod, to the north side of a barn. They are protected by louvered wings at the sides, and by a closed board roof.

The rain-gauge is situated in the garden, about 25 feet distant from the barn. Its top is 2 feet above the ground.

EASTERN PLATEAU — CORTLAND COUNTY.

STATION, CORTLAND — PROFESSOR D. L. BARDWELL, OBSERVER.

Established in June, 1895; latitude, 42 deg. 36 min.; longitude, 76 deg. 13 min; elevation, 1,130 feet.

The valley in which Cortland is situated is broad and level, the surrounding country, however, being hilly, with summits rising 1,600 feet or more above sea-level.

Maximum, minimum and an exposed thermometer are placed in a shelter of the standard U. S. Weather Bureau pattern, which are on the grounds of the normal school. The instruments are about 6 feet above the ground.

The rain-gauge stands upon the top of a flat-roofed building three stories in height.

EASTERN PLATEAU — DELAWARE COUNTY.

STATION, SOUTH KORTRIGHT — MR. D. C. SHARPE, OBSERVER.

Established (by Signal Service) in 1888; equipped by State Service, February, 1890; latitude, 42 deg. 20 min. north; longitude, 74 deg. 43 min. west; elevation, 1,700 feet.

This station is located in a deep valley of the Catskill mountains through which the western branch of the Delaware river flows in a southwesterly direction. On the southern side of the val-

ley the mountains rise to a height of about 1,000 feet, and to a somewhat less elevation on the northern side. The valley at this point is about one-half mile wide, the station being located near its center.

The maximum and minimum thermometers are exposed in a doorway about 2 feet deep, on the north-northwest side of Mr. Sharpe's house.

The instruments face toward the northeast, and are never reached by the direct sunlight. The hall into which the door leads is unheated. The walls of the building are of wood. The thermometers are about 8 feet above the sod.

The rain-gauge is 20 feet distant from the south side of the house. The top of the gauge is 2 feet above the ground.

EASTERN PLATEAU — ORANGE COUNTY.

STATION, MIDDLETOWN — IN CHARGE OF SELDEN H. TALCOTT, M.

D. AT THE STATE HOSPITAL.

Established January, 1890; latitude, 41 deg. 25 min. north; longitude, 74 deg. 25 min. west; elevation, 700 feet.

The State hospital is located about 1 mile southwest of Middletown, and is about 50 feet above the city. The ground slopes rapidly away from the station toward the north and east, but southward the country is nearly level with the station, or rises slightly above it.

The dry and wet maximum and minimum thermometers are exposed on the northern side of a wing of the hospital, one and one-half stories in height. The instruments are secured to framework facing the window, 2 feet distant from it, and 10 feet above the ground. The thermometers are about 4 feet below the roof, which, extending 4 feet beyond the wall, is utilized as a shelter. The rays of the sun are entirely excluded from the instruments and the sod beneath, in the morning by the high wall of the main building, which extends for 170 feet or more toward the north, and in the afternoon by a northern extension of the

wing. The window is only opened for the purpose of moistening the wet-bulb thermometer. The room within is unheated but the corridor in the basement beneath is warmed by steam during the winter. The thermometers are about 40 feet distant from the main building.

The rain-gauge is exposed on a lawn east of the main building and about 100 feet from it. There are no obstructions to a free air circulation in the vicinity of the gauge, other than a few ornamental shrubs 30 or 40 feet distant.

EASTERN PLATEAU — ORANGE COUNTY.

STATION, PORT JERVIS — PROFESSOR JOHN M. DOLPH, OBSERVER.

Established November, 1889; special temperature station; equipped with a thermograph in December, 1890; latitude, 41 deg. 21 min. north; longitude, 74 deg. 40 min. west; elevation, 470 feet.

Port Jervis is situated between the Delaware and Neversink rivers, at a short distance north of their point of junction. The valley of the Delaware makes an abrupt turn at this point, from the southeast to the southwest, the Neversink river entering from the northeast at the bend. The surface rises gradually toward the north in the vicinity of the station, which is about 50 feet above the river surface. But beyond the city limits high hills close in abruptly about the valley.

The thermometers and thermograph are exposed in a louvered shelter built substantially after the pattern employed by the United States Weather Bureau. The shelter is about 20 feet from the northeastern side of the house, and 3 feet above the ground.

The rain-gauge is placed upon a post at a height of 4 feet 8 inches above the ground, between two low buildings whose roofs rise above the gauge to a height about equal to their distance from it.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, COOPERSTOWN — MR. G. POMEROY KEESE, OBSERVER.

Established 1854; latitude, 42 deg. 41 min. north; longitude, 74 deg. 57 min. west; elevation, 1,300 feet.

Cooperstown is situated in the valley at the southern end or foot of Otsego lake, hills rising abruptly on the eastern and western sides of the town. The stream flowing south from the lake through a narrow valley, forms one of the principal sources of the Susquehanna river. The meteorological station is 200 feet southwest from the shore of the lake, and is sufficiently isolated from the buildings of the town to admit of a very free air circulation. The hills on the eastern and western sides of the valley are respectively one-half and three-fourths of a mile from the station.

The dry, wet, maximum and minimum thermometers are secured to the side posts of a northern piazza of Mr. Keese's residence; their distance from the ground being about 9 feet, and from the piazza roof, 5 feet. The sun reaches the piazza only near the hours of rising and setting, and at these times one-half of the piazza is always in the shade of a projecting doorway; hence by moving the thermometers from one side of the piazza to the other, they are kept shaded for several hours preceding the time of observation. The walls of the house are of brick, from which the instruments are separated by at least several inches of air space.

The rain-gauge is 60 feet south of the house, and has no obstacle to a free air circulation in its vicinity. The top of the gauge is 4 feet above the ground.

Mr. Keese's record of temperature was kept during 36 years from readings of a Green standard thermometer, with which the instrument furnished by this service early in 1890 was found to agree closely. The rain-gauge in use for 36 years was the Pike "conical" form, which, as compared with the gauge of the New York Bureau, is found to give a slightly deficient registration. The exposure of the instruments has been substantially the same during the entire period of the record.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, GARRATTSVILLE — MR. F. J. CAMPBELL, OBSERVER.

Established in January, 1897; latitude, 42 deg. 38 min.; longitude, 75 deg. 13 min.

Mr. Campbell's house is located upon a side hill, facing south-east toward the valley of Butternut creek.

Maximum and minimum thermometers are exposed upon a porch extending from the north side of Mr. Campbell's house, and are not reached by the sun's rays at any time.

The rain-gauge stands upon the top of a post 6 feet in height.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, NEW LISBON — MR. G. A. YATES, OBSERVER.

Established November, 1892; latitude, 42 deg. 35 min. north; longitude, 75 deg. 13 min. west; elevation, 1,234 feet.

This station is situated in the open country on the rolling lands of the Butternut Creek valley, which is here about three-fourths of a mile wide, the adjacent hills being of moderate elevation.

Maximum and minimum thermometers are exposed in a louvred shelter of United States standard form and dimensions; their height from the sod being 6 feet. The shelter is 30 feet northeast of Mr. Yates' house, and is near, but not directly under, a fruit tree.

The rain-gauge is supported by a fence post at a height of 6 feet from the ground. A barn 40 feet away is the nearest building.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, ONEONTA — MESSRS. FORD AND FORD, OBSERVERS.

Established August, 1894; latitude, 42 deg. 27 min. north; longitude, 75 deg. 6 min. west; elevation, 1,000 feet.

The town of Oneonta is situated in a valley of the eastern highlands, at the junction of the Susquehanna, Charlotte and Schenectady rivers.

The maximum and minimum thermometers are exposed in front of the drug store of Messrs. Ford, on the north side of Main street. The instruments are 6 feet above the sidewalk. Direct sunlight is excluded by an awning; but the pavement is liable to become heated in the early morning and the late afternoon.

The rain-gauge is mounted at the center of the flat tin roof of the business block, at a height of about 40 feet from the ground; the bottom of the gauge resting upon the roof.

EASTERN PLATEAU — SCHUYLER COUNTY.

STATION, PERRY CITY — MR. W. H. JEFFERS, OBSERVER.

Equipped with standard instruments in December, 1889; latitude, 42 deg. 03 min. north; longitude, 76 deg. 44 min. west; elevation, 1,038 feet.

This station is located about 4 miles west-southwest of Trumansburgh, on the hills west of Cayuga lake, from whose shore it is about 6 miles distant. Mr. Jeffers' house is situated on the west bank of a brook which, after flowing southward 50 rods, meets a larger stream emptying into Cayuga lake; the ground rising gradually from the valley of the creek toward the northwest and south. At a distance of 8 miles to the south is the range of Newfield hills, whose summit reaches an altitude of 2,100 feet; and a similar high tract of land lies to the west of the station near Seneca lake. The valley in which the station is situated, with others opening out of it, form an irregular depression extending through this western range of hills.

The maximum, minimum, wet and dry bulb thermometers are exposed in a shelter built on the north side of a low wing of Mr. Jeffers' house. The bottom of the shelter, which is about $4\frac{1}{2}$ feet above the ground, is constructed of slat work, which cuts off radiation from the sod. The sides are louvred in the manner adopted by the Signal Service, and a slanting roof and a door opening toward the north are provided.

The rain-gauge is about 80 feet east of the house and about 30 feet south of a corn house. The gauge is 2 feet 9 inches above the ground.

EASTERN PLATEAU — TIOGA COUNTY.

STATION, WAVERLY — MR. T. P. YATES, OBSERVER.

Established by Signal Service in August, 1887; latitude, 42 deg. 01 min. north; longitude, 76 deg. 34 min. west; elevation, 824 feet.

This station is near the northeastern limits of the village of Waverly, and its surroundings are more like an open country than might be expected from its proximity to the village. The station is about two-thirds of the distance between the gradual slope from the Susquehanna river and the hills a mile away, which form the northern boundary of the valley. The elevation of the hills in this vicinity, on either the north or south side of the valley, probably does not exceed 300 to 500 feet.

The dry and wet bulb and the maximum and minimum thermometers are exposed in a shelter 40 feet east of Mr. Yates' house. The shelter consists of a double unpainted box open at the bottom having an air space 1 inch in width between the sides, and with slat work at the top opening to the ventilators in the ridged roof. Some additional ventilation is also obtained through a few spaces from one-eighth to one-fourth of an inch in width between the boards at the sides of the shelter. The dimensions of the shelter (outside) are 2 by 3 feet at the base and $2\frac{1}{2}$ feet in height, exclusive of the roof. The thermometer supports are secured to a board near the back or south side of the inner box, and the door of the shelter opens toward the north. The height of the thermometers above the sod is $4\frac{1}{2}$ feet.

The rain-gauge is 6 feet north of the shelter, 45 feet from the house (which has two stories and an attic), and about 35 feet from the branches of a large fruit tree. The top of the gauge is 6 feet above the ground.

EASTERN PLATEAU — TOMPKINS COUNTY.

STATION, DRYDEN — MR. J. GILES FORD, OBSERVER.

Established in July, 1896; latitude, 42 deg. 29 min.; longitude, 76 deg. 13 min.; elevation, 1,079 feet.

This station is located in a broad valley, opening toward the north, west and southeast.

The maximum and minimum thermometers are exposed out of a north window of the second story of Mr. Ford's house. They are 13 inches from the window, which is never opened below 6 inches above the thermometers. A hinged hood is provided for protection from morning and evening sun, and weather. A roof extends out from the building, four and one-half feet below the instruments.

The rain-gauge stands upon the ground and is 20 feet distant from a low building, which offers little obstruction to air circulation.

EASTERN PLATEAU — ULSTER COUNTY.

STATION, MOHONK LAKE, AT THE MOUNTAIN HOUSE — MR. A. K.
SMILEY, OBSERVER.

Established in November, 1895; latitude, 41 deg. 47 min. north; longitude, 74 deg. 09 min. west; elevation, 1,235 feet.

This station is situated about 12 miles west of the Hudson river upon a mountain ridge separating the Shawangunk and Wallkill valleys. Immediately east of the station the ground falls away precipitously for several hundred feet to the valley lands, and thence, more gradually, to the Wallkill river, between which and the Hudson the surface is comparatively flat. There is also a sharp descent from the Mountain House to the valley on the northwestern side. The summit of the range is a ridge of rocks rising a hundred feet or more from the eastern border of Mohonk lake; the Mountain House being situated in the northwestern side, and commanding an unobstructed view over the valley in that direction.

The dry, wet-bulb, maximum and minimum thermometers are exposed on the southeastern piazza of a small building belonging to the hotel, and fronting toward the lake. The instruments are secured to the side of the house, and are protected by the piazza roof, which is about 17 feet wide. They are exposed to the rays of the sun between the hours 8 and 9 a. m. Their height above the ground is 10 feet, and above the water surface 18 feet.

The rain-gauge stands on a floating boat wharf at a distance of 150 feet from the nearest building or woods. The top of the gauge is 3 feet above the lake.

NORTHERN PLATEAU — FRANKLIN COUNTY.

STATION, SARANAC LAKE — EDWIN R. BALDWIN, M. D., OBSERVER.

Established November, 1893; latitude, 41 deg. 19 min. north; longitude, 74 deg. 08 min. west; elevation about 1,500 feet.

This station is situated in the village of Saranac Lake, one-eighth mile from the Saranac river, and 75 or 100 feet above its surface; the ground about the station being very nearly level. A hill rises about 100 feet above the station toward the north-east, and at a considerable distance north and northeastward is a range of the Adirondack mountains.

Maximum, minimum, dry and wet-bulb thermometers are placed in a shelter having louvred sides, its dimensions being 26 inches in length, 18 inches deep and 28 inches high. The shelter has a peaked shingled roof, and is painted white. It is located in the rear of Mr. Baldwin's house, over turf, and is 50 feet from the nearest building. The thermometers are $4\frac{1}{2}$ feet from the ground.

The rain-gauge stands near the shelter, and is 2 feet above the ground.

NORTHERN PLATEAU — FULTON COUNTY.

STATION, GLOVERSVILLE — MR. L. W. CHAMBERLAIN, OBSERVER.

Established (by Mr. Chamberlain) December, 1883; latitude, 43 deg. 5 min. north; longitude, 74 deg. 30 min. west; elevation, 850 feet.

The city of Gloversville is situated on the southern slope of the Adirondack Plateau, near the upper limits of a valley tributary to the Mohawk; the city being about 600 feet above the Mohawk river. The station stands on the city hospital grounds, which slope sharply upward at the eastern border of the city.

The instrument shelter stands on the slope west of and below the hospital building, 38 feet distant; and there are no objects nearer than this to obstruct the air circulation. The shelter, containing a full set of thermometers, is constructed after the specifications of the Weather Bureau, and stands 5 feet above the sod.

The rain-gauge is located on the same slope 20 feet north of the shelter, and at about the same level.

Mr. Chamberlain has made careful and systematic observations upon the weather for the past fifteen years.

NORTHERN PLATEAU — HERKIMER COUNTY.

STATION, NORTH LAKE — MR. E. A. KLOCK, OBSERVER.

Established in July, 1896; latitude, 43 deg. 31 min.; longitude, 75 deg. 04 min.; elevation, 1,822 feet.

This station is situated upon the shore of North Lake, in the Adirondack wilderness. Wooded mountains rise in the vicinity to an average altitude of about 300 feet above the lake.

Maximum and minimum thermometers are mounted in a slatted (or louvered) and roofed shelter, whose dimensions are 3 x 3 feet front and 8 inches deep. The shelter faces north. It is mounted upon a post at a height of 30 feet from the ground, a platform being built immediately below the shelter.

The rain-gauge stands 3 feet from the instrument shelter, and 30 feet distant from the nearest building. Its top is 3 feet above the ground.

NORTHERN PLATEAU — LEWIS COUNTY.

STATION, LOWVILLE — MR. CHARLES S. RICE, OBSERVER.

Established in May, 1890; latitude, 43 deg. 47 min.; longitude, 75 deg. 30 min.; elevation, 900 feet.

Lowville is situated in the valley of the Black river, which lies between the high ridge of the "Tug Hill" range, on the west, and the more distant Adirondack highlands on the east.

The surface rises westward from the river in "terraces" upon one of which Mr. Rice's station is situated, being about half a mile distant from the village of Lowville, and considerably above it.

Maximum and minimum thermometers are exposed 5 feet above a grass plat, in a slatted shelter having a double roof. It stands half way between the house and barn, 50 feet from each.

The rain-gauge is placed near the thermometer shelter. It is raised 4 feet above the ground.

NORTHERN PLATEAU — LEWIS COUNTY.

STATION, NUMBER FOUR — MR. CHARLES FENTON, OBSERVER.

Established by the National Service in December, 1888; equipment completed by the State in December, 1889; latitude, 43 deg. 50 min. north; longitude, 75 deg. 12 min. west; elevation, 1,571 feet.

The station, Fenton's Number Four, is 18 miles east of Lowville, near the western limits of the Adirondack wilderness. The station stands on a plateau which commands a view of Beaver lake, about one-half mile distant, and also a considerable range of the surrounding country in all directions. Since the hills in this section are much lower than the peaks of the eastern Adirondacks, the air circulation about the station is nearly unobstructed.

The dry, wet bulb and maximum and minimum thermometers are exposed near the northwest corner of Mr. Fenton's main building in a single-louvred shelter of the Signal Service pattern. The shelter is about 11 feet above the ground, and is reached by a narrow platform extending out about 10 feet from the piazza of the house. It is exposed to the rays of the sun until about 9 in the morning; but during the remainder of the day the shelter is shaded by the main building.

The rain-gauge is situated on open ground, free from obstacles to a favorable exposure. The height of the funnel is about 3 feet from the ground. The barometer (by Schneider Bros.) is hung near the window of an unheated room on the first floor of the building.

COAST REGION — SUFFOLK COUNTY.

STATION, BRENTWOOD — MR. W. H. ROSS, M. D., OBSERVER.

Established February, 1891; latitude, 40 deg. 45 min. north; longitude, 73 deg. 14 min. west; elevation, 75 feet.

This station is situated in the village of Brentwood, at a distance of one-fourth mile from the Hotel Austral.

The maximum and minimum, dry and wet bulb thermometers are exposed on the north side of Dr. Ross' residence, about 6 feet above the floor of a veranda, whose roof acts as a shield from the sun and weather. Their height above the ground is 7 feet. The rain-gauge has a favorable exposure upon an open plat of ground.

COAST REGION — SUFFOLK COUNTY.

STATION, SETAUKET — MR. SELAH B. STRONG, OBSERVER.

Equipped with State instruments in January, 1890; latitude, 40 deg. 57 min. north; longitude, 73 deg. 05 min. west; elevation, 40 feet.

This station is situated 1 mile northeast of Setauket post-office upon a neck of land projecting into estuaries of Long Island sound. The Oldfield light, a prominent point of the northern coast of Long Island, is about 1 mile distant toward the northwest.

Mr. Strong's house stands on ground 40 feet above sea-level, with an open exposure on all sides excepting the northeast, where a cedar grove stands on a slight elevation.

The instrument shelter, containing a full equipment of thermometers, is fastened to a window casing on the north side of the house. It is louvred on three sides, with slat work at the bottom; the side facing the window being open. The dimensions of shelter are: Width, 20 inches; height, 24 inches; depth, 10 inches. Its height above ground is 6 feet, and the distance from the window 4 inches.

The roof of an open piazza prevents the rays of the afternoon sun from reaching the shelter, while a grove toward the east has a similar effect in the morning.

The rain-gauge stands upon nearly level ground, and is well removed from obstructions to a free air circulation. Its height above ground is 12 inches.

Observations upon temperature and rainfall have been made continuously at this station since 1885, Signal Service instruments being used until 1890.

COAST REGION — WESTCHESTER COUNTY.

STATION, BEDFORD — MR. WILLIAM A. HYDE, OBSERVER.

Established in March, 1894; latitude, 41 deg. 11 min. north; longitude, 73 deg. 39 min. west; elevation about 290 feet.

Mr. Hyde's residence is situated in the hamlet of Bedford Centre, having practically the exposure of the open country, which is a rolling plateau in this vicinity.

The maximum and minimum thermometers are located under the roof of a porch, on the south side of the house. They are secured to a post, at an elevation of 6 feet above the ground, and 5 feet above the piazza floor. Rays of the sun are excluded from the instrument by maple shade trees and by a screen over the thermometers.

The rain-gauge is mounted about 4 feet above the ground, on the fence of an open lot. The exposure is very satisfactory.

HUDSON VALLEY — COLUMBIA COUNTY.

STATION, LEBANON SPRINGS — MR. ARTHUR K. HARRISON, OBSERVER.

Established in March, 1892; latitude, 42 deg. 29 min. north; longitude, 73 deg. 20 min. west; elevation, 930 feet.

This station is located on the eastern side of a narrow valley which runs nearly north and south through the high hills of eastern Columbia county.

The maximum and minimum thermometers are exposed on the northern side of a building under a "hood;" their distance from the walls of the building being 5 or 6 inches, and from the ground 5 feet.

The rain-gauge is exposed in a slightly sloping, open meadow. Its height above ground is 1 foot 4 inches.

HUDSON VALLEY — DUTCHESS COUNTY.

STATION, WAPPINGER'S FALLS — MR. H. C. TOWNSEND, OBSERVER.

Equipped with rain-gauge May, 1890, with maximum and minimum thermometers in February, 1893; latitude, 41 deg. 35 min. north; longitude, 73 deg. 56 min. west; elevation, 110 feet.

This station is located at the eastern edge of the town of Wappinger's Falls, in the valley of Wappinger's creek. The surrounding country is broken, one of the higher hills rising about 300 feet west of the station. The station stands on a point of land extending into Wappinger's lake, a body of water 1 mile long and about half a mile wide.

The maximum and minimum thermometers are exposed on the northwestern side of a small wing of Mr. Townsend's house, and in a shallow angle formed by the wing and the main portion of the house. They are protected by a shelter 3 feet high, 3 feet wide and 1 foot deep; its top and back being of solid wood, and the front and sides of lattice work. During the summer the sun reaches the shelter for about an hour in the morning and afternoon, but at other seasons it is entirely shaded. The thermometers are 5 feet 2 inches above the ground and 8 inches from the wing wall. The room within is not heated.

The rain-gauge is 50 feet from the house, and at ample distance from trees and buildings. Its top is 7 feet 4 inches above the ground.

HUDSON VALLEY — DUTCHESS COUNTY.

STATION, HONEYMEAD BROOK — DR. JAMES HYATT, OBSERVER.

Equipped April, 1890; latitude, 41 deg. 51 min. north; longitude, 73 deg. 42 min. west; elevation, 450 feet.

This station is situated about 1 mile southeast of the village of Stanfordville and is about 4 rods distant from the track of the N. D. and C. R. R. The valley through which this road passes opens toward the south-southwest into the Hudson valley; hence it is thought that the meteorological conditions of the station are similar to those of the Hudson valley north of the Highlands. The general surface rises for several miles east and southeast from the station to the high hills west of the Harlem valley, while in its immediate vicinity the ground is broken by numerous irregular hills having a comparatively small elevation.

The dry and wet bulb, and the maximum and minimum thermometers are placed at the angle formed by the northeast side of the main portion of Mr. Hyatt's house and the northwest side of a wing projecting about 4 feet from the main building, the instruments thus fronting toward the north. The thermometers, excepting the maximum, are sheltered by board sides and bottom, and a sloping roof, the front being wholly open to the northwest,

and the back half open. The maximum thermometer is placed near by, outside the shelter. The wings of the house exclude the sun at all hours.

The rain-gauge, which was constructed by Mr. Hyatt, is 70 feet southeast of the house. Its top is $4\frac{1}{2}$ feet above the ground. Its readings agree well with the gauge of the State service.

HUDSON VALLEY — DUTCHESS COUNTY.

STATION, POUGHKEEPSIE, VASSAR COLLEGE OBSERVATORY.

Latitude, 41 deg. 41 min. north; longitude, 73 deg. 53 min. west; elevation, 180 feet.

This station is located on a plateau 180 feet above the Hudson river and about 2 miles from its eastern bank. The country is rolling and quite flat in the immediate vicinity, giving an open exposure.

The thermometers are placed in a louvred shelter of standard pattern, about 50 feet from the college observatory, and not far from a clump of evergreen trees. The shelter is exposed to sunlight excepting in the early morning and late afternoon. The thermometers are 5 feet above the sod.

The rain-gauge is a copper bucket, 10 inches in diameter, made by Badger & Sons, furnished by the New England Weather Service. It is about 40 feet distant from the observatory.

HUDSON VALLEY — PUTNAM COUNTY.

STATION, CARMEL — MR. THOMAS MANNING, OBSERVER.

Date of establishment not known; latitude, 41 deg. 25 min. north; longitude, 73 deg. 40 min. west; elevation, 500 feet.

This station is about 1,000 feet east of the village of Carmel, near the foot of a gradual descent from the village. The surrounding country is much broken by abrupt, irregular hills, probably not exceeding 300 or 400 feet in height above the general surface.

The station is equipped with a maximum and minimum thermometer, owned by Mr. Manning, and a rain-gauge of the pattern used in the Croton aqueduct system. The thermometers are exposed on the northern piazza of Mr. Manning's house, at the height of 5 feet above the floor, and at about the same distance below the roof. The instruments are about 15 feet from the western or nearest end of the piazza, the roof of which (8 feet in width), with the hill westward, probably shields the thermometer from the direct rays of the sun at all hours.

The rain-gauge is on level ground, about 100 feet south of the house, and has an unobstructed air circulation about it. The funnel of the gauge is about 12 inches in diameter, and its height above the ground is 12 inches.

CHAMPLAIN VALLEY — SARATOGA COUNTY.

STATION, SARATOGA — MR. W. H. HALL, M. D., OBSERVER.

Established October, 1890; special temperature station; latitude, 43 deg. .05 min. north; longitude, 73 deg. 48 min. west; elevation, 270 feet.

The general surface in the vicinity of Saratoga is a plain, bordered on the west by the Palmerstown range of hills, and on the east ridges of lesser height separate the plain from the Hudson river. The station is, no doubt, subject to the conditions of both the Champlain and Hudson valleys; but the character of the topography of Saratoga county indicates that the prevailing air currents are from the north rather than the south. There are no records of previous systematic meteorological observations for Saratoga covering a period longer than one year.

The thermograph was removed in May, 1892, from the location described in the report of 1890, and is now exposed out of the north window of the tower of the High School building, at a height of 50 feet from the ground.

CHAMPLAIN VALLEY — WARREN COUNTY.

STATION, GLENS FALLS — PROF. C. L. WILLIAMS, OBSERVER.

Established October, 1891; latitude, 43 deg. 19 min. north; longitude, 73 deg. 40 min. west; elevation, 340 feet (approximately).

Glens Falls village is at the southern border of Warren county, on the bank of the Hudson river, which at this point flows eastward through a broad valley. The country is nearly flat toward the south, and also northward as far as the French mountain range on the eastern shore of Lake George.

The station is located at the Glens Falls academy, No. 60 Warren street. The shelter is secured to the northern side of a wood building, 10 by 10 feet, which is built against the brick school building. The shelter is 30 inches high by 18 inches deep by 24 inches wide. Its sides are of wood, free air circulation being obtained by slits at all the edges, and through the wire screen in front. The height of the thermometers (dry, wet, maximum and minimum) is 4 feet from the ground.

The rain-gauge is placed 2 feet above an open plat of ground and 60 feet from any buildings.

ST. LAWRENCE VALLEY — JEFFERSON COUNTY.

STATION, WATERTOWN — MR. F. M. PORTER, OBSERVER.

Established October, 1890; transferred to Mr. Porter in July, 1894; latitude, 43 deg. 57 min. north; longitude, 75 deg. 54 min. west; elevation, 580 feet (approximately).

This station is located at Mr. Porter's residence, 154 State street, about $1\frac{1}{2}$ miles southeast of the business center of Watertown, its exposure being practically that of the open country. The station stands near the summit of a ridge, being about 100 feet higher than the former station in the city.

The thermometers hang in a shelter 2 feet 8 inches long, 12 inches deep and 3 feet high, with louvred windows and a glazed door in front. The roof is sloping, the bottom and back are closed, the door opening toward the northeast. The shelter is situated midway between a low wing of the house and the barn, 30 feet distant from each. It is secured to a post at a height of 5 feet above the sod.

A barometer located in a room on the first floor of the house was found to be out of adjustment and was returned to the central office for correction.

The rain-gauge is fastened at the back of the shelter, its top being well above the roof and 7 feet from the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, NORTH HAMMOND — MR. C. A. WOOSTER, OBSERVER.

Established (by the National Service with a standard thermometer) in November, 1888; and completely equipped by the State Service in December, 1889; latitude, 44 deg. 30 min. north; longitude, 75 deg. 40 min. west; elevation, about 340 feet.

The station is situated in the open country 6 miles north of the Hammond depot of the Rome, Watertown and Ogdensburg railroad, and about 1 mile from the St. Lawrence river. Northwestward from the station the surface of the country is nearly flat, with a gradual slope toward the river; whilst toward the east, and 300 feet from the station, the general surface rises some 30 or 40 feet. There are no high hills in the vicinity of the station.

The dry, wet and maximum and minimum thermometers are exposed on the northwestern side of a wing of the observer's house, and under the roof of a piazza 5 feet wide. The instruments are secured to the wood work of the wing 6 feet above the floor and 9 feet above the ground. The room within is heated throughout the year; but as a check, a standard thermometer located in a shaded position away from the veranda is read at each observation and thus far the results have agreed very closely. The sun's heat is excluded from the piazza until late in the afternoon, when the floor and the walls are liable to radiate their heat to the instruments. Efforts have been made to remedy this defect.

The rain-gauge is located about 20 feet west of the wing of the house ($1\frac{1}{2}$ stories in height), and a distance from a low outbuilding equal to the height of the latter. The top of the gauge is about 5 feet above the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, CANTON — MR. C. W. BOLTON, OBSERVER.

Established November, 1889; instruments transferred from Prof. Henry Priest to present observer in March, 1894. Latitude, 44 deg. 35 min. north; longitude, 73 deg. 12 min. west; elevation, 304 feet.

The meteorological station is located at the summit of a slope on the north side of the Grasse river, which is about 300 feet distant. Although within the limits of the village, the station has a very open exposure.

The thermometers are secured to the northern wall of a frame building, at a distance of 3 feet from the northwest corner. A screen toward the west cuts off all direct rays of the sun; but to prevent direct radiation to the thermometers from the ground in the afternoon, a shelter having louvred sides and front, with a solid top and bottom, was to be placed around the instruments. These are now placed about $5\frac{1}{2}$ feet above the ground.

The rain-gauge is located about 30 feet from the house, and is also about the same distance from the barn. The height of portions of these buildings adjacent to the gauge is about equal to their distance from it.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, POTSDAM — MR. G. W. F. SMITH, OBSERVER.

Established December, 1889; latitude, 44 deg. 40 min. north; longitude, 75 deg. 01 min. west; elevation, 200 feet.

This station is situated on Leroy street, Potsdam, at a distance of 1 mile north from the center of the town, and well removed from other buildings. The station is about 100 feet above the tracks of the Rome, Watertown and Ogdensburg railroad, on the summit of a knoll which is the highest point within a radius of a mile. The ground slopes gradually away from the station in all directions. The surrounding country is flat as far as the Adirondack foot hills, nearly 10 miles distant.

The dry and wet bulb and maximum and minimum thermometers are exposed in a shelter which is built out from the window on the north side of a low, unheated building attached to Mr. Smith's resi-

dence. The shelter is louvred at the sides and front, and in the rear a small door gives access to the instruments from the interior of the building. The dimensions of the shelter are about 3 by $2\frac{1}{2}$ feet at the base, and 3 feet in height. It has a slanting double roof and slat bottom. The rays of the sun touch the top of the shelter at noon, but are excluded from it at other times by the walls of the building, and also by a pine tree west of the house. The walls adjacent to the shelter are of wood. The height of the thermometers above the ground is 6 feet.

The rain-gauge is located 70 feet north of the house, and about 25 feet from a few small fruit trees. The top of the gauge is 5 feet above the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, OGDENSBURG, AT THE ST. LAWRENCE STATE HOSPITAL.

Established December, 1889; latitude, 44 deg. 43 min. north; longitude, 75 deg. 30 min. west; elevation, 258 feet.

The State Hospital is situated on a broad, open plain, within 100 rods of the St. Lawrence river, and about 2 miles from the center of Ogdensburg. The thermometers (which belong to the hospital) are located on a third-story balcony of the administration building opening towards the west-southwest. They are exposed in a shelter 24 inches broad by 30 inches deep, and 6 feet in height, louvred from top to base (which rests on the piazza floor). The shelter is painted brown. The dry and wet bulb and maximum and minimum thermometers are located midway between its sides, being 5 feet above the floor and 36 feet above the ground. The piazza becomes heated from the direct rays of the sun in the afternoon; and hence the maximum temperatures indicated may be somewhat too high.

The rain-gauge is located 75 feet southeast from the nearest building, upon a lawn. Its top is 9 inches above the ground.

GREAT LAKE REGION — CHAUTAUQUA COUNTY.

STATION, WESTFIELD — MR. G. SCHOENFELD, OBSERVER.

Established in October, 1895; latitude, 42 deg. 21 min. north; longitude, 79 deg. 37 min. west; elevation, 758 feet.

This station is situated in the open country, 2 miles from Lake Erie, toward the north, and 2 to 3 miles from the main ridge of the Chautauqua county hills toward the south. The surface is a plain slope from the lake toward the hills.

The thermometers are exposed on the north side of a building, 2 feet from its walls and 8 feet above the ground. They are protected by a hood or roof and by lattice work sides; the dimensions of the shelter being 2 x 2 x 3 feet. They are not exposed to direct sunlight or other source of heat.

The rain-gauge stands on level ground, 35 feet from the nearest building. Its top is 8 feet above the ground.

This locality is not subject to autumn frosts or very severe winter weather, a week of continuous sleighing being rare. There is less rain and dew than on the highlands. Brisk winds are frequent.

GREAT LAKE REGION — MONROE COUNTY.

STATION, PITTSFORD — REV. G. H. GOMPH, OBSERVER.

Established in June, 1895; latitude, 43 deg. 05 min. north; longitude, 77 deg. 34 min. west; elevation, 515 feet.

The land about Pittsford is slightly rolling, with a general slope in a northerly direction into the Irondequoit basin and Lake Ontario. The station is situated at the western end of the village.

The maximum and minimum thermometers are exposed in a shelter built out from the north window of an unused second-story room, their distance from the ground being 15 feet. The shelter is built of window blinds, and is about 18 inches deep, 2 feet 6 inches wide in front and 3 feet 6 inches at the rear. The bottom and top are open, but the cornice of the house, 6 feet above, affords partial protection from weather. Direct rays of the sun are excluded at all hours.

The rain-gauge stands on nearly level ground, and is 60 feet distant from any trees or buildings. The top of the gauge is 6 feet above the ground.

Interesting notes as to the course of thunderstorms in this vicinity are furnished by the observer.

GREAT LAKE REGION — NIAGARA COUNTY.

STATION, APPLETON — MR. H. A. VAN WAGONER, OBSERVER.

Established, August, 1889; latitude, 43 deg. 20 min. north; longitude, 78 deg. 41 min. west; elevation, 270 feet.

This station is situated in the open country, on the broad plain of northern Niagara county, at a distance of 1 mile from Lake Ontario.

The dry and wet bulb maximum and minimum thermometers are mounted, under a hood, at the northern end of Mr. Van Wagoner's house. They are shielded from the sun's rays at all hours; in the morning by a wing of the house and also by a canvas screen, and in the afternoon by a building a dozen feet to the west. The instruments are about 5 feet from the ground.

The rain-gauge stands between the house and barn, being about 50 feet distant from each. Its top is 4 feet nine inches above the ground.

GREAT LAKES — OSWEGO COUNTY.

STATION, PALERMO — MR. E. B. BARTLETT, OBSERVER.

Observations commenced in 1854; equipped with standard maximum and minimum thermometers (by Signal Service) in July, 1887; fully equipped by State Service in February, 1890; latitude, 43 deg. 24 min. north; longitude, 76 deg. 20 min. west; elevation, 460 feet.

This station is situated in the open country about 6 miles south-southwest of the town of Mexico, Oswego county. The surface of the surrounding country is rolling; the ridges, which are generally low, extending from northwest to southeast. A hill, said to be the highest point in Oswego county, lies $3\frac{1}{2}$ miles southeast of the station, but no marked rise of ground occurs until within half

a mile of the summit. The station is situated on the northern slope of one of the ridges mentioned. The ground rises rapidly for a short distance at the rear or south side of the station, but falls away from it on the eastern and northeastern sides, thus giving a free circulation of air from the east, north and west.

The thermometers are exposed in a shelter of the dimensions and pattern used by the United States Weather Bureau. This shelter is 6 feet above the ground and 17 feet from the north side of Mr. Bartlett's house.

The rain-gauge is 50 feet from the northeast corner of the house in a clear space. The bottom of the gauge is 1 inch above the ground.

Details as to the manner in which long records of temperature and rainfall were obtained by Mr. Bartlett may be found in the report of this bureau for the year 1890.

GREAT LAKES — WAYNE COUNTY.

STATION, LYONS — MR. WILLARD H. VEEDER, OBSERVER.

Date of establishment not known, but prior to 1888; latitude, 43 deg. 06 min. north; longitude, 77 deg. 00 min. west; elevation, 407 feet.

Mr. Veeder's house is on or near the summit of the gradual slope on which the town of Lyons is situated. The ground falls away gently from the station to the northeast and south, but toward the west is nearly level for a quarter of a mile, to the base of an abrupt ridge, extending in a north and south direction, and 75 to 100 feet in height. The general character of the surrounding country is that of a plain, broken by numerous isolated low hills. The thermometers are exposed in a single-louvred shelter about $3\frac{1}{2}$ feet in width by 3 feet in height, which is placed out of the window of an unheated room on the second floor and north side of the house. The shelter has a sloping roof and its bottom is closed. The front and sides are of single-louvred work, while at the back the raising of the window-sash gives access to the thermometers. In the early summer the shelter is exposed to the sun up to about 9 a. m., but is shielded from solar rays during the remainder of the day.

The rain-gauge is placed on a roof having a southeastern exposure, and is 12 feet above the ground. A second roof rises about 6 feet above the gauge, at a distance of 18 feet from it, and 16 feet toward the northwest a roof also rises about 10 feet above the gauge.

CENTRAL LAKES — CAYUGA COUNTY.

STATION, FLEMING — MR. ROBERT WARWICK, OBSERVER.

Established December, 1889; latitude, 42 deg. 51 min. north; longitude, 76 deg. 36 min. west; elevation, 1,000 feet.

This station is situated in the open country, on the ridge of land lying between Cayuga and Owasco lakes, its distance from the latter being about $2\frac{1}{2}$ miles, and from the city of Auburn 4 miles. The surface in the vicinity of the station is quite flat, but with a general slope downward toward the north.

The thermometers have recently been removed from the shelter described in the report of 1890, and are now exposed in a corn-house, whose north side is of open lattice work. The thermometers are suspended on the north side of the house, 3 feet from the lattice and 6 feet from the ground.

The rain-gauge is located about 100 feet west of Mr. Warwick's house, and is well removed from obstructions to a free air circulation.

CENTRAL LAKES — SENECA COUNTY.

STATION, ROMULUS — MR. J. H. CORYELL, OBSERVER.

Instruments transferred from Mr. B. E. Hicks September 7, 1891; latitude, 42 deg. 43 min. north; longitude, 76 deg. 56 min. west; elevation, 719 feet.

This station is situated in the western part of the village of Romulus, near the summit of the ridge separating the basins of Cayuga and Seneca lakes. The high southern plateau terminates in a somewhat abrupt descent at Ovid, 6 miles south of Romulus, north of which a comparatively flat country extends to Lake Ontario.

The thermometers are exposed in a single-louvred shelter 20 inches wide, 36 inches long, and 30 inches high, with a hinged bottom, and a drop-door in front facing the west. The shelter is located at the eastern side of the house, and is exposed to the direct rays of the sun only from 10 to 12 a. m. The instruments are hung in the center of the shelter at a height of 5 feet 6 inches above the ground.

The rain-gauge is 30 feet distant from any buildings or trees, the nearest of the latter being small shrubs 8 feet high. The gauge is 30 inches above the ground.

CENTRAL LAKES — TOMPKINS COUNTY.

STATION, ITHACA — AT THE COLLEGE OF CIVIL ENGINEERING, CORNELL UNIVERSITY.

Established 1874; latitude, 42 deg. 27 min. north; longitude, 76 deg. 29 min. west; elevation, 810 feet.

This station is situated on the hill bordering the eastern side of Cayuga Lake valley, its distance from the head of the lake being about 1 mile and its elevation above the lake level 400 feet. South of the city of Ithaca, which lies immediately below the station, the valley divides into two branches, the first and main branch extending through the hills toward the southwest, while the second forms the narrow channel of Six Mile creek, which flows from the highlands southeast of the city into Cayuga lake. The meteorological station has an open exposure toward the main valley on the west, while eastward, after a slight rise near the station, the surface is nearly flat along the course of the Fall creek; but numerous hills arise to heights varying from 300 to 500 feet above the general level, at distances of a mile or more to the southeast of the station.

The instrumental equipment of the station is as follows:

Barometers.—These instruments are placed in the basement clock room of the engineering college.

1. The standard, a Fuess normal siphon barometer, is so constructed that any error due to the presence of air at the top of the mercurial column may be detected and approximately corrected by varying the capacity of the cistern, and so making the column occupy more or less of the vacuum chamber at the top. The pressure of any gas in the vacuum chamber will increase as the space is diminished, so that, under these conditions, the readings will not agree.

2. A Draper barograph furnishes a continuous record of pressure. The cistern of this instrument is suspended upon long spiral springs, while the main tube is fixed. The proportions of the various parts are such that a rise of pressure forces the mercury up into the tube from the cistern, which then rises; and a decreasing pressure produces a contrary effect. The record is made by a pen attached to the cistern, which bears against a record sheet moved horizontally by clock work. Since this barograph acts by balancing the weight of the mercurial column against the weight of the atmosphere, the correction for the temperature of the mercurial column is very small, falling within the limits of other errors of the instrument. The latter seldom amount to 0.01 inch.

3. A Green's Fortin barometer of the ordinary pattern, having a fixed zero point, to which the level of the cistern is adjusted, is used for purposes of current comparisons.

Thermometers.—1. Standard dry bulb and maximum and minimum thermometers are mounted in a shelter of the Weather Bureau pattern. The shelter stands about 40 feet east of the college building, upon a grass plot sloping downward toward the west; the height of the instruments above the sod being about 6 feet.

2. A continuous record of temperature is furnished by a Richard thermograph placed in the shelter. The pen tracing the record is attached to an arm whose position is governed by the expansion or contraction of a metal tube filled with alcohol. The recording sheet is carried by a cylinder, revolved by clock-work, at the rate of one turn per week. This thermograph, which is very accurate when properly adjusted, is checked by comparison with the adjacent standard thermometer.

Hygrometers.—The shelter also contains a hair hygrometer (Richard's), whose registering mechanism is similar to that of the thermograph; but in this case the pen arm is moved by the expansion and contraction of a bundle of hairs which are rendered very sensitive to the action of moisture by a special process of the makers. The index or datum of this hygrometer is liable to change somewhat during prolonged wet or dry periods; but gives very satisfactory results when adjusted from time to time to agree with the values of humidity indicated by the whirled psychrometer. (See "Instructions to voluntary observers" for full information regarding the latter instrument.)

A Richard dry and wet bulb recording hygrometer has also been used at this station, but thus far has not proved as satisfactory as the instrument just described. In principle it consists of two Richard thermographs, one of which has its alcohol tube moistened constantly by muslin dipping into a reservoir, while the other tube is kept dry. The instrument is so constructed, however, that the records of both dry and wet bulbs are traced upon the same cylinder.

Evaporometer.—An evaporometer (Richard's) is located beneath the shelter at a height of 2 feet from the ground; direct sunlight and driving rain or snow being excluded by louvered sides. The evaporometer consists, essentially, of a pair of scales, one pan of which carries the water, whose evaporation is to be measured, and a pen attached by suitable mechanism to the scale arm, which records on a rotating cylinder the rise or fall of the scale beam as the quantity of water is diminished or increased.

Actinometer.—An actinometer or sunshine recorder (Richard's) is mounted on a shelf out of a south window of the college. The intensity of solar heat is measured by the difference in temperature between two glass bulbs 4 inches in diameter, placed side by side, one of which is coated with lamp-black while the other is silvered. The two have the same temperature (nearly) when the sky is overcast, but the black bulb absorbs the heat of solar rays more rapidly than the bright under a clear sky. Each

bulb contains a coil of copper tube filled with alcohol, and communicating with separate tubes similar to those of the thermographs, each of which has its recording lever and pen, whose tracings are made on a cylinder rotating once in two days. The differences between the temperatures traced by the two levers indicate the intensity of the solar radiation.

Wind Registers.—Two sets of wind registers are in use at the central station, each set furnishing an automatic record both of velocity and direction. Firstly, the instruments provided eighteen years ago by the director, and whose records have since been maintained, are mounted about 8 feet above the ridge of the engineering building and 75 feet above the ground. The wind vane has for its axis a rod which is brought down through the roof, and carries at its lower extremity a cylinder about 3 inches in diameter and 9 inches long. A pencil held in a suitable carriage moves vertically down the length of the cylinder in 24 hours; and since the cylinder turns with the vane, the pencil tracing upon a sheet of paper which is wrapped around the cylinder, furnishes a continuous record of the wind direction.

The anemometer, which is of the Robinson pattern, has four hemispherical cups carried on spokes radiating from a vertical axis. Rotation is caused by the greater force which the wind exerts upon the concave over that upon the convex sides of the cups; and when the number of revolutions indicates 1 mile of wind travel, an electric contact is made by a mechanism attached to the axle of the anemometer. Wires attached to the instrument transmit the current to a Gibbon register located on the first floor of the building. A screw-thread is cut upon the axis of the recording cylinder of this register, and as it is rotated by clockwork at the rate of one turn in 6 hours, the screw also gives it a motion lengthwise with the axis, so that a pen in a fixed position would trace a spiral line around its surface. In fact, the recording pen is attached to the pole piece of an electro-magnet in circuit with the anemometer, and hence, at every mile-contact, a notch is made in the spiral line

traced by the pen upon the recording sheet, and the number of miles of wind travel for any given time is found by counting the number of these notches. It is necessary to replace the recording sheet each day.

A second wind vane and pair of anemometers are mounted on the tower of McGraw hall, one of the University buildings, standing on the crest of the hill and overlooking the Cayuga valley. These instruments are 12 feet above the roof of the tower, and 140 feet from the ground, being thus more exposed to the full force of the wind than those just described. The anemometer for measuring horizontal wind currents is of the Richard's construction, consisting of a small wind-mill with 6 inclined vanes radiating from a horizontal axis, which axis, extending into a metal case, makes an electric contact with each hundred revolutions by means of suitable gearing. The entire apparatus revolves freely about a vertical axis in the same manner as an ordinary wind-mill, and is made to face the wind by a broad, wedge-shaped tail at the rear. The vertical axis, which is tubular, passes down into the interior of the tower, and within it are carried the wires which transmit the measurements of wind velocity.

As the instrument was furnished by the makers, the cylinder upon which the record of wind direction is traced, was fixed to the lower end of the axis of the wind-vane; but since the registers at the central station are located in the Engineering building, 600 feet distant from the anemometers, a different arrangement was necessary. The present device consists, firstly, of a fixed metallic ring (a) 3 inches in diameter, through the center of which the lower end of the wind-vane axis passes. This ring is divided into four segments or quadrants, each being connected with a wire passing to the corresponding quadrant of a similar ring (b) on the register in the distant building. A metallic contact piece secured to the wind-vane axis bears against the quadrants of (a), passing from one to the other as the direction of the wind changes. The ring (b) also has its contact piece, which is secured to the axis of the recording cylinder, said cylinder being rotated uniformly by clock work at the

rate of one turn in 6 minutes. Its contact piece is in circuit with one pole of an electric battery, the other pole being grounded; and the contact piece of (a) is also grounded through the wind-vane axis. Hence, when the contact piece of (b), in its steady rotation, passes over the quadrant corresponding to that upon which the wind-vane contact is resting, a current is allowed to pass through (b) and its connecting wire to (a) and thence to the ground. This current actuates an electro-magnet in the register, thus pressing a pen against the cylinder until its contact piece, by rotation, passes off from the quadrant corresponding to the wind direction, when it is released. The pen falls vertically the length of the cylinder once in 24 hours, and, in the manner explained above, at every revolution of the cylinder, leaves a trace upon that part of its circumference which corresponds to the direction of the wind at the time.

The register, as thus described, records the wind direction only to four points; but by broadening the contact piece of (a) so that it can bear upon portions of two quadrants at the same time, as, for example, upon the north and west quadrants, for a northwest wind, both north and west are recorded upon the cylinder, and such a tracing is read northwest.

As previously stated, the wires of the velocity register pass through the hollow axis of the vane; and at the lower extremity of the latter are connected through mercury cups with wires running to the Engineering building. At every hundredth revolution of the anemometer, corresponding to 100 meters of wind, a circuit is made through an electro-magnet of the register; and this turns the proper recording cylinder through one one-thousandth part of a complete revolution. The recording pen (which is attached to the same carriage with that of the direction register), traverses the length of the cylinder in 24 hours, and thus leaves upon the tracing sheet a spiral line, every complete turn indicating 100 kilometers of wind.

In addition to the hundredth meter contact, the anemometer is also provided with a second contact, which is made at every revo-

lution of the anemometer wheel, and the circuit thus established is transmitted to a Richard's anemo cinemograph, devised to register the details of the wind movement, and to show its maximum force during gusts. In this instrument an electro-magnet and mechanism operated by it, raise the pen arm of the cinemograph about one-thirty-second of an inch at every contact; while a clock-work depresses the arm at a rate proportionate to its distance from the zero position. With a given wind velocity, therefore, the arm takes a position such that the rate at which it is being raised by the anemometer contacts exactly balances that at which it is being depressed by the clock movement; and in this position is quickly changed to correspond with variations in the wind velocity. As in the other instruments, the height of the pen above the zero point is registered upon a band of paper carried by a uniformly rotating cylinder. As the cinemograph is needed chiefly to record the force of violent gusts, a mechanism has been devised which puts it in operation only when the wind velocity exceeds 30 miles per hour.

A Richard's anemometer for measuring the force of vertical air currents (or their vertical components), is also placed on the tower of McGraw hall. This anemometer has four inclined blades or fans, rotating about a vertical axis, upward and downward currents turning it in opposite directions. Two sets of contacts are provided, one of which is operated by upward and the other by downward currents. The number of turns of the anemometer is registered upon a cylinder in the manner employed for recording horizontal velocities, excepting that the cylinder is made to turn to the right by downward currents, and in the opposite direction by upward currents. The movement of the cylinder is also ten times more rapid than in the case of the horizontal register for winds of the same velocity.

Rain-gauges of three kinds are in use at the central station.

1. An ordinary 8-inch gauge of the Weather Bureau pattern, which is the standard.
2. A Ferguson self-registering gauge,

which weighs the water or snow in the receiver by means of a spring-balance, and automatically records the amount upon a strip of paper wound around a cylinder placed beneath the gauge.

3. A Wild-Fuess electric recording gauge, whose registering mechanism is inside the Engineering building. The gauge has a funnel about 14 inches in diameter at the top, which discharges through a small tube into tilting buckets beneath. The buckets are balanced in such a manner that when one is filled it tips downward and empties, while the second bucket is brought under the tube from the funnel, and in its turn is filled and tipped. Each time this operation is completed, an electric circuit is made through wires connected with the register in the building. The record is made upon a strip of paper hanging vertically from a roll at the top of the case, and weighted at its lower end. The electric circuit, operating an electro-magnet and ratchet-wheel, drops the strip of paper about one-fiftieth of an inch at each tilt of the bucket, so that the distance through which the weight and strip of paper falls measures the amount of rainfall. The time register is made by a pen-arm moving horizontally across the paper strip (about $1\frac{1}{2}$ inches wide) each hour, and sliding rapidly back to its initial position at the end of the hour. When no rain is falling, these horizontal hour lines are separated by the making of a contact within the clock, which moves the paper downward through the same space due to a tilt of the bucket. In dry weather, therefore, the paper is ruled with parallel horizontal lines about one-fiftieth of an inch apart; but a rainfall separates the lines by an amount corresponding to the amount of water falling in an hour. .

CENTRAL LAKE REGION — YATES COUNTY.

STATION, PENN YAN — MR. RALPH L. EASTMAN, OBSERVER.

Established in July, 1897; latitude, 42 deg. 40 min.; longitude, 77 deg. 05 min.; elevation, 750 feet.

Penn Yan is situated in the valley at the foot of Kenka lake; the surrounding hills being of moderate elevation, and the exposure rather open.

Dry and wet maximum and minimum thermometers are located in a shelter built after the United States Weather Bureau specifications. The shelter stands in the center of a yard which is open toward the north and south, while buildings stand 15 and 25 feet distant toward the east and west respectively.

The rain-gauge is located in the same yard, the nearest building being 15 feet distant, toward the southwest.

Cornell University—Agricultural Experiment Station.

TENTH ANNUAL REPORT

OF THE

Agricultural Experiment Station.

ITHACA, N. Y.

1897.

TRANSMITTED TO THE LEGISLATURE JANUARY, 14, 1898.

WYNKOOP HALLENBECK CRAWFORD CO.,
STATE PRINTERS,
NEW YORK AND ALBANY.
1898.

STATE OF New YORK

No. 22.

IN ASSEMBLY,

JANUARY 14, 1898.

TENTH ANNUAL REPORT

OF THE

Agricultural Experiment Station of Cornell University.

STATE OF NEW YORK:

DEPARTMENT OF AGRICULTURE,

ALBANY, January 14, 1898.

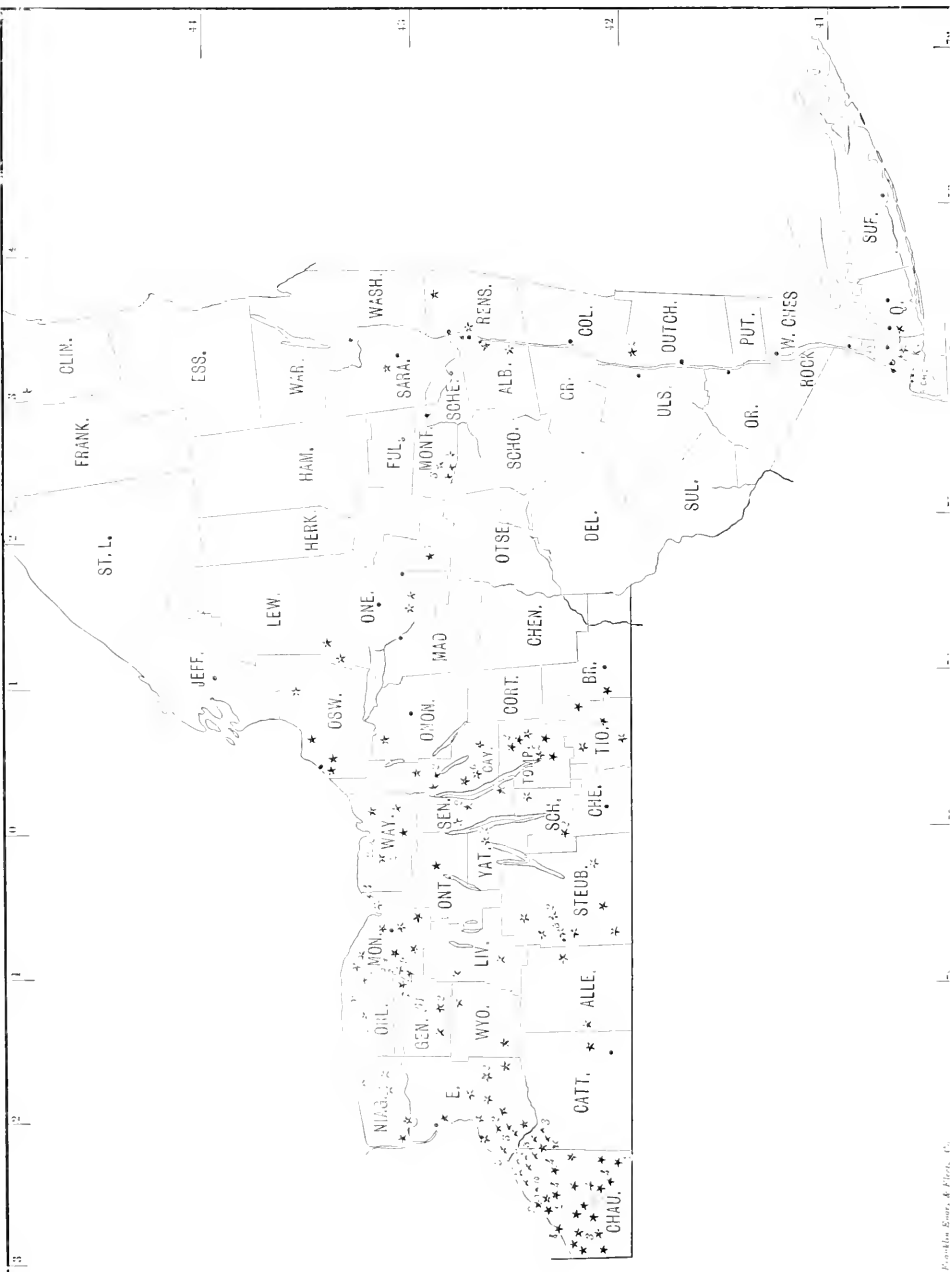
}

To the Honorable the Legislature of the State of New York :

In accordance with the provisions of the statutes relating thereto, I have the honor to herewith transmit the 10th Annual Report of the Agricultural Experiment Station at Cornell University.

CHARLES A. WIETING,

Commissioner of Agriculture.



ORGANIZATION.

BOARD OF CONTROL:

THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	President State Agricultural Society.	
Professor I. P. ROBERTS,	-	-	-	-	- Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	- Chemistry.
Professor JAMES LAW,	-	-	-	-	- Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	- Entomology.
Professor L. H. BAILEY,	-	-	-	-	- Horticulture.
Professor H. H. WING,	-	-	-	-	- Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	- Botany.

M. V. SLINGERLAND,	-	-	-	Assistant in Entomology.
G. W. CAVANAUGH,	-	-	-	Assistant in Chemistry.
L. A. CLINTON,	-	-	-	Assistant in Agriculture.
B. M. DUGGAR,	-	-	-	Assistant in Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	Treasurer.
EDWARD A. BUTLER,	-	-	-	-	Clerk.

In pursuance of the provisions of Chapter 128 of the Laws of 1897, the following persons have been appointed investigators and instructors in the College of Agriculture of Cornell University to serve throughout the State according to the needs of the several localities for a portion or all of the year.

J. W. SPENCER,	M. V. SLINGERLAND,	MISS M. F. ROGERS,
G. T. POWELL,	B. M. DUGGAR,	A. L. KNISLEY,
G. A. SMITH,	J. L. STONE,	C. E. HUNN,
W. W. HALL,	MRS. A. B. COMSTOCK,	H. B. CANNON.

REPORT.

*His Excellency, the Commissioner of Agriculture of the State of
New York, Albany, N. Y.*

SIR:—

I have the honor to transmit herewith the tenth annual report of the Agricultural Experiment Station of Cornell University, in accordance with the Act of Congress of March 2, 1887, establishing the Station.

While the investigations of the Station are all believed to be of great value, and the fourteen bulletins issued during the last six months are each and all worthy of note, I may be permitted to call special attention to the work in furtherance of scientific agricultural investigation carried on under Chapter 128 of the Laws of the State of New York for 1897. Through teachers' leaflets and similar means an attempt is being made to prepare the farmers of the State of New York for intelligent and helpful co-operation in the experiments carried on by the Station; and at the same time to carry on extensive experiments under the varying conditions of climate and soil which obtain in the different portions of the State. These experiments are at present in three lines, sugar beet culture, horticulture and the use of commercial fertilizers, and it will be readily seen from the maps accompanying this report, on how large a scale these experiments have been planned. I cannot but believe that the capabilities of the Station will by these means be enormously increased.

I have the honor to be your obedient servant,

J. G. SCHURMAN,
President of Cornell University.

REPORT OF THE DIRECTOR.

To the President of Cornell University.

SIR:—

The letter of Mr. A. C. True, Director of Experiment Stations, Washington, D. C., hereunto attached, explains why this report is written at this time instead of at the end of the calendar year as has been the custom heretofore. It should be noticed that the financial part of this report covers the fiscal year ending June 30th, 1897; that part of it which relates to the publications and work undertaken covers but six months, January 1st to July 1st, 1897, and hence is not so extended as was last year's report which covered a full calendar year.

The State appropriated (Chapter 128 of the Laws of 1897) \$25,000 for "giving instruction by means of schools, lectures and other University Extension methods, or otherwise, and in conducting investigations and experiments; in discovering the diseases of plants and remedies therefor; in ascertaining the best methods of fertilization of fields, gardens and plantations; and best modes of tillage and farm management and improvement of live stock; and in printing leaflets and disseminating agricultural knowledge by means of lectures or otherwise; and in preparing and printing for free distribution the results of such investigations and experiments, and for republishing such bulletins as may be useful in the furtherance of the work; and such other information as may be deemed desirable and profitable in promoting the agricultural interests of the State." This appropriation has made it possible to greatly enlarge the scope of our work and to employ additional help to carry on investigations and instruction in fields not heretofore covered. It has also made it possible to republish several valuable bulletins, which were out of print, for which there is a growing demand.

The work under Chapter 128, Laws of 1897, began in April and has been carried on vigorously up to the present time. Two sets of circulars were prepared and sent out, one in which were

given full directions for conducting culture experiments with sugar beets, selecting land, preparing the soil, planting, tillage, harvesting and preparing specimens for analysis, together with diagrams showing the size, number and arrangement of plats. The Department of Agriculture at Washington furnished the beet seed which was distributed to three hundred and sixteen experimenters. The experiments are being conducted in thirty-four of the sixty counties of the State. The other circular was prepared by the Chemical Department and it, in like manner, gave full directions for carrying out experiments with sugar beets and other crops on plats treated with commercial fertilizers of known weight and composition together with unfertilized check plats. The Station purchased and sent out two hundred and three sets, each set containing five small sacks of fertilizer. These investigations cover forty-seven counties of the State and hence are, as well as those previously mentioned, being carried on under varied climatic and soil conditions.

The farmers of New York know but little about sugar beet culture, soil or fertilizers best adapted to the highest development of the beet. By these extended experiments it is hoped that much useful information will be disseminated and that the farmers will be led to carry on investigations on their own account in the future, while the Station will be able to discover the districts and the kind of tillage and fertilizers which give promise of highest results.

On the University farm twelve plats which are separated from one another and from the adjoining land by cemented brick walls two feet deep, have been planted to sugar beets, with and without fertilizers. Soil to the depth of two feet was removed, eight inches at a time, and placed in three piles. After the walls were built each pile of earth was thoroughly mixed and returned in the reverse order of its removal. It is hoped by this means to secure normal out door conditions while securing absolutely like conditions of soil-texture and composition.

The most difficult and original experiment undertaken is the introduction into the schools of what, for want of a more appropriate name, has been called "Nature Study." For a long

time many educators have seen that there is a great gap in the courses of study offered in the schools above the primary grade. By common consent it is agreed that no more courses can be added and it is not clear what studies, if any, can be omitted, but all agree that the youths of the land should become interested in the plants and animals and other natural objects by which they are surrounded and with which they will have to do in after life. It was found that by conducting the work, not as a study but as a rest exercise for a few minutes each day, great interest was aroused and that instead of adding to the pupil's work, it lightened it and created a desire to become better acquainted with Nature in garden, field and wood. To start this work, leaflets have been prepared by persons especially fitted for the work, these have been printed and distributed, usually to teachers, though in a few cases to the pupils.

Leaflets I., "How a Squash Plant gets out of the Seed;" II., "How a Candle Burns;" III., "Four Apple Twigs;" and V., "Some Tent Makers," have gone to a third edition; Leaflet IV., "A Children's Garden," for pupils and teachers, to a fifth edition; Leaflet VI., "What is Nature Study," to a second edition, and twenty thousand copies of Leaflet VII., "Hints on Making Collection of Insects," were issued June 1, 1897.*

Mr. John W. Spencer and Mr. John L. Stone, have conducted the Extension work and some of the experiments in the western half of the State. Mr. George T. Powell and Miss Mary Rogers have conducted like work in the eastern half of the State. Mr. George A. Smith and Mr. W. W. Hall have conducted the instruction in dairy husbandry throughout the State.

These three groups of experimenters and instructors have been assisted from time to time by the professors and instructors of the College and Station and by a few special helpers not connected with the University. Honorable Charles R. Skinner, Superintendent of Public Instruction, and Honorable Charles A. Wieting, Commissioner of Agriculture, have given us hearty and efficient support.

* For a sketch of the origin and progress of the Agricultural Extension Work see Cornell Bulletin 137, May, 1897.

The majority of farmers are anxious to secure a better and more extended understanding of their profession. They are difficult to reach because they had no training in their special occupation while in school, and not because they are unwilling to learn. It is humiliating to look over the courses of study offered to farmers' children and see what scant and poor provision has been made for teaching anything which has a direct relation to tilling the soil or for giving any inspiration which might help them to discover the laws which govern the soil, the plant and the animal. This Extension work in Nature Study is as yet an experiment. Its aim is primarily to reach and help the teachers and through them the farmer with the hope and expectation that the pupils and their parents will be taught both useful and interesting facts and that they will come to see the need of investigating for themselves. Each farm and each crop has its own problems to be solved, the Experiment Stations can give valuable assistance, but climate, soil plants and conditions vary so widely that the farmer who desires to reach better results must experiment for himself. It is believed that the Extension work has materially assisted in securing the hearty co-operation of more than five hundred farmers in the experiments which are being carried on throughout the State.

The first object in issuing leaflets on Nature Study is to promote investigation, to arouse enthusiasm, to open the eyes of pupils and parents, in order that the future tillers of the soil may become better acquainted with Nature's laws and modes of action, thereby enabling them to direct Nature's laws so intelligently as to produce highest results.

Until the middle of this century no instruction nor real help had been offered to the tillers of the soil, so it is no wonder that the very foundations of scientific, applied and experimental agriculture are yet to be laid in the schools, or that the term "Nature Study" is selected in order to make agricultural instruction popular.

Fourteen bulletins embracing three hundred and thirty-three pages have been issued during the last six months on the following subjects:

No. 124, The Pistol-Case-Bearer in Western New York.

No. 125, A Disease of Currant Canes.

No. 126, The Currant-Stem Girdler and The Raspberry-Cane Maggot.

No. 127, A Second Account of Sweet Peas.

No. 128, A Talk About Dahlias.

No. 129, How to Conduct Field Experiments [with Fertilizers.

No. 130, Potato Culture.

No. 131, Notes upon Plums for Western New York.

No. 132, Notes upon Celery.

No. 133, The Army-Worm in New York.

No. 134, Strawberries under Glass.

No. 135, Forage Crops.

No. 136, Chrysanthemums of 1896.

No. 137, Agricultural Extension Work: Sketch of its Origin and Progress.

Circular No. 5, Concerning Co-operative Tillage Experiments.

Circular No. 6, Directions for the Application of the Fertilizers and Records to be made.

Brief reports of the progress of the work in charge of the various divisions of the Station and the Treasurer's report are hereunto appended, together with a detailed and classified report of receipts and expenditures for the fiscal year ending June 30, 1897.

Assistant Professor of Dairy Husbandry H. H. Wing has been given a leave of absence for nine months, and is now in Europe, making an extended study of the dairy industries of England, Holland, Sweden and Denmark. Therefore no report of progress in dairy husbandry is submitted. It may be said that extended investigations have been and are being conducted along dairy lines, the results of which will be published in the early part of next year.

Some extended investigations have recently been instituted by the Veterinary Division of the Station for the purpose of securing a fuller knowledge of the causes of contagious abortion in milch

cows in hopes that with a clearer understanding of causes a remedy may be discovered for this disease which has been so prevalent during the last quarter of a century and which has caused more loss in the dairy than all other diseases combined.

Reports which have reached us from many parts of the State during the last year indicate that the mortality among swine has been unusually large, due to causes which have not yet been discovered. Experiments have been begun with a view of determining the cause and remedy for this trouble.

The force of the Station has been doubled during the last two years, many investigations and experiments along lines which bear upon nearly every agricultural industry of the State are being vigorously prosecuted and the Station staff is working harmoniously and enthusiastically for a common purpose—the advancement of those industries which are embraced under the generic term “Agriculture.”

I. P. ROBERTS.

**UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
WASHINGTON, D. C.**

JUNE 29, 1897.

DEAR SIR:—

The experiment stations in 15 States now make the annual reports of their operations as well as their financial reports cover the fiscal year ending June 30. Now that this Department is required to make a report to Congress on the work and expenditures of the Stations for each fiscal year, it would be better as far as we are concerned if it was the uniform practice of the Stations to make their annual reports for the fiscal year. There is nothing in the Hatch act to forbid this. That act simply calls for an annual report without defining exactly the period to be covered.

If we could receive the report of the work and expenditures of all the Stations by September 1, it would enable us to make our report to Congress at the opening of the session in December. It would then receive proper consideration by the committees in connection with the appropriation bill. As it is now, the information available for these committees is a year old when the report is considered and may unfairly represent the condition of affairs at a number of the Stations at that time.

Very truly yours,

A. C. TRUE, Director.



REPORT OF THE CHEMIST.

To the Director of the Cornell University Agricultural Experiment Station.

SIR:—

The following is a report of work done in the Chemical Laboratory between July 1, 1896, and June 30, 1897.

Name.	Analyzed for	Number of Samples.
Soils.....	Water	47
Soils.....	Nitrogen, phosphoric acid and potash	7
Fodders	Fodder analysis	34
Fodders	Nitrogen, phosphoric acid and potash	3
Celery plants	Nitrogen, phosphoric acid and potash	10
Apple tree leaves....	Nitrogen, phosphoric acid and potash ...	3
Urine of horse	Phosphoric acid	8
Grapes	Acid and sugar.....	20
Sugar beets.....	Sugar	4
Potatoes.....	Nitrogen and starch	4
Clover roots	Nitrogen.....	4
Clover tops	Nitrogen	3
Clover nodules.....	Nitrogen.....	1
Paris green	As ₂ O ₃ (arsenic trioxide)	2
Ashes	Phosphoric acid and potash.....	1
Commercial K salts..	Potash.....	2
Water	Lime, magnesia and potash.....	1
Manure.....	Nitrogen, phosphoric acid and potash	1
Callierine.....	.....	1

156

In addition the A. O. A. C. work was done on potash.

G. C. CALDWELL.

REPORT OF THE BOTANIST.

July 1, 1897.

Professor I. P. Roberts, Director.

DEAR SIR:—

I have the honor to present the following report of the Botanical Division of the Experiment Station for the past six months.

There have been published two Bulletins during the year, as follows: A Disease of Currant Canes, Bulletin 125, February, 1897, by E. J. Durand, assistant botanist during the previous year. Two Destructive Celery Blights, by B. M. Duggar, assistant botanist. These articles were published in Bulletin 132, March, 1897.

Work is in progress upon the following subjects: A very thorough study has been made of several of the parasitic fungi known as anthracnoses which attack fruits and various vegetables. The matter is being prepared for a bulletin but considerable time is necessary to complete it because of the numerous illustrations. It is hoped, however, to present it sometime during the coming autumn.

A great deal of attention is being given to the preparation of illustrations in the way of fine photographs of the larger fungi known as mushrooms, with a view to publishing a series of bulletins on the edible, poisonous and indifferent species in the State, for the purpose of arousing an interest in the value for food of the edible species and to give simple directions for becoming acquainted with the more common species.

Studies are also in progress on the diseases of timber and forest trees, and already many valuable illustrations have been made for future bulletins of an educational character, as well as of scientific value.

In connection with this, investigations have been begun upon the development and embryology of certain of the forest trees, especially, at present, the pines and other conifers, with a view to determining rate of growth, distribution, fertility of seed, as well as the conditions which influence or modify the life of these trees.

Mr. B. M. Duggar, the assistant botanist, is engaged upon several lines of investigation. Practical and scientific studies are being made by him of certain celery diseases, and of the leaf spot of the pear. Other investigations are being started which will lead to important results it is hoped. Beside the work of investigation and of instruction which Mr. Duggar is carrying on, the correspondence is constantly increasing in reference to diseases of various kinds which attack fruits, vegetables, etc., so that a considerable part of his time is taken up with these matters.

The work of the year besides the results of the investigations has added materially to the equipment of the Division in the way of illustrations, negatives, etc., besides the additions to the apparatus by purchase.

Very respectfully yours,

GEO. F. ATKINSON,

Botanist.

REPORT OF THE ENTOMOLOGIST.

To the Director of the Cornell University Agricultural Experiment Station.

SIR:—

As the carrying out of the Entomological work of the Station has been performed during the past six months almost entirely by the Assistant Entomologist, I have requested him to prepare a report on it, which I hereby transmit.

Very respectfully yours,

JOHN HENRY COMSTOCK,

Entomologist.

To the Entomologist of the Cornell University Agricultural Experiment Station.

SIR:—

During the period covered by this report (from January 1st, 1897, to July 1st, 1897), the work of the Entomological Division of the Station has been along the same lines as in previous years, but it has been of a somewhat different nature in some respects. Thus far, the year 1897 has been quite a remarkable one in New York State, so far as the prevalence of insect life is concerned. Many of our common insect pests which are more or less destructive every year have been conspicuously numerous and injurious, while some other insects which usually harass the fruit grower every year have attracted attention to themselves by their absence or non-occurrence in injurious numbers.

In the former class are to be mentioned plant-lice, which have been much more numerous and destructive on many different kinds of vegetation all over the State than for many years before; canker worms have again ravaged many acres of apple orchards in the western part of the State; in May and June, thousands of apple and wild cherry trees all over the State bore the unsightly tents

of the common apple-tree tent caterpillar (*Clisiocampa americana*), and many of the trees were entirely stripped of their foliage by the ravenous hordes of these caterpillars; at the present time (July 1st), the forest-tent caterpillar (*Clisiocampa disstria*) is ravaging acres of shade and forest trees in several parts of the State (it was mistaken for the gypsy moth in Delaware county); the pearpsylla has again appeared in immense numbers in many pear orchards and the crop of fruit is seriously threatened. On the other hand, however, as we predicted in Bulletin 133, the army-worm seems not to have attracted attention anywhere in the State this year, although thousands of armies of the worms ruined thousands of acres of field crops last year; many of the larger plum growers in the State have been agreeably surprised this year to find that their old and dreaded enemy—the plum curculio—did not appear in numbers sufficient to make it necessary to go to the trouble and expense of fighting it; one of our largest quince growers also writes that the quince curculio (*Conotrachelus crataegi*) also appeared in surprisingly small numbers this summer; we had intended to begin a critical study of the life-history of white grubs this spring but were unable to find enough of the May beetles to start the experiment; for two or three years the crops of New York farmers have suffered from hordes of grasshoppers, but this year, doubtless owing to the work of their enemies and to climatic conditions, grasshoppers appear to be scarce in many localities.

Thus the year 1897 has thus far been one of peculiar interest, from an entomological standpoint, in New York. The facts given in the above paragraph have been brought out by our extensive correspondence and by personal observations while engaged in lecture work under the auspices of the Nixon Bill.

No new outbreak of any insect pest has thus far occurred which seemed to necessitate carrying on extensive experiments at the insectary in the study of its habits or methods of combating it. Our time has been fully occupied in continuing work that was begun last year or in previous years, also in preparing some of last year's results for publication, and in attending to the mass of correspondence arising from the sudden and unusually destructive outbreaks of the well-known insect pests mentioned above.

However, as the quince curculio was so destructive last year in some localities as to lead growers to seriously consider the advisability of cutting down their orchards, we have taken up the critical study of its habits this year and hope to be able to reach some practicable conclusions regarding methods of controlling such a serious pest.

The following bulletins have been published from this Division during the past six months:

No. 124, The Pistol-Case-Bearer.

No. 126, The Currant-Stem Girdler and the Raspberry-Cane Maggot.

No. 133, The Army-Worm in New York.

Our inability to get the results of our last year's study of the codlin moth ready for publication in the spring has enabled us to verify our observations this year; our conclusions will soon be put in shape for publication as a bulletin. The results of our last year's applications in our extensive peach borer experiment have just been ascertained, and they reveal some striking and valuable facts which will add much definite data to our knowledge of how to fight this serious peach pest. We expect to be able to collate and digest the details of our work with this insect which have accumulated during the past three years, and get the conclusions ready for publication during the coming year.

Our endeavor to give each correspondent the latest and best information at our command results in a rapid increase in the correspondence of this Division. About five hundred queries were answered during the past six months; fifty of these were prepared for publication in agricultural journals. The fact that we are thus often enabled to reach special and urgent cases quickly, renders the correspondence of this Division one of the most valuable and important features of its work. We have also published several technical articles in entomological journals.

Respectfully submitted,

M. V. SLINGERLAND,

Assistant Entomologist.



REPORT OF THE AGRICULTURIST.

To the Director of the Cornell University Agricultural Experiment Station.

SIR :—

Since my last report to you two bulletins have been published by the Department, No. 130, Potato Culture, and No. 135, Forage Crops. These bulletins give the results of experiments extending over a period of two years. To verify the results published, the experiments are being repeated this year and the results will probably be published as a supplementary bulletin. An interesting line of work, and one which now promises well, is the intro-culture of grain crops. For three years the experiment has been conducted with wheat and this year it has been extended to oats. A question which is seriously puzzling the farmers of the State is how they can best control the wild carrot, the mustard and the cress, all of which have been abundant in the oat fields the past season. We believe that a practical solution of the question will be found in intro-culture. It remains now to have manufactured some implement so that the work can be performed cheaply and efficiently by horse-hoe tillage.

The study of leguminous plants and their comparative value as nitrogen gatherers, commenced last year, is being continued. An effort is being made to determine what portion of the nitrogen stored up by the clover plant is actually taken from the atmosphere and what from the soil. The investigation in connection with this work will necessarily have to be extended over a series of years.

Certain leguminous plants which in their native soil and climate produce root tubercles have been found not to produce them here. By a system of soil inoculation it is hoped that these nodules or tubercles may be induced to grow and that

we may thus add to the list of our valuable nitrogen-gathering leguminous plants.

In the spring of 1896, one thousand white ash seedlings were set in the University woodland. These seedlings were purchased and set at a total cost of only two cents each. From seventy-five to eighty per cent. of them are now living and making good growth. The result of this experiment so far would indicate that much of the hilly land unfit for cultivation could far more profitably be devoted to forestry.

Many causes have combined to awaken an interest in the manufacture of beet sugar. This department is conducting extensive experiments to determine whether the beets can be profitably grown in this State, what system of tillage is best, and what fertilizers are required to give the highest per cent. of sugar. Beet seed, with directions for planting the same and caring for the product, have been sent to over three hundred farmers who are co-operating in the experiment. The work with sugar beets at the home grounds this year is mainly in determining what fertilizers give best results both as to yield, sugar content and purity.

The work of the Division is largely confined to lines of investigation which are practical in their nature, and an attempt is being made not only to discover new truths but to emphasize and enforce old ones, and to show plainly that success in agriculture depends largely upon improved practices and methods of tillage.

Respectfully submitted,

L. A. CLINTON,

Assistant Agriculturist.

REPORT OF THE HORTICULTURIST.

To the Director of Cornell University, Agricultural Experiment Station.

SIR :—

In the absence of Professor Bailey, I can make only a partial report of the progress of work in this Division from January 1st to July 1st, 1897.

Of the out-door work the successful contest with the San José scale is perhaps the most pressing for early publication. Two thorough and timely sprayings with kerosene and water, in a combination of one part to four, saved all the kinds of shrubs treated, and we have not seen a live insect since. This experience has brought out a number of points which will doubtless be welcome news in the midst of the general anxiety. Among the tree fruits, progress has been made in the permanent orchards which were devoted to carefully planned and far reaching fertilizer experiments. Some new varieties of Japanese plums are fruiting for the first time and the Station is fortunate in having the expert services of Mr. S. D. Willard, of Geneva, in judging the varieties of this popular new type of plums. A new vineyard has been set and important accessions made. The work in small fruit culture has consisted largely of local fertilizer experiments in six strawberry fields of Oswego county, the results of which are very gratifying and of great general interest. Two beds of strawberries have been set, one of new varieties, and one to continue the indoor work. In vegetable gardening we are in the midst of our second year of investigations with celeriac and Brussels sprouts. An acre of celery has also been planted on the onion meadows of Orange county in an attempt to introduce the culture of this crop within easy shipping distance of the large eastern markets. In floriculture the work is confined to studies of cannas, dahlias,

and to the vexed problems concerned in the forcing of Bermuda lilies for Easter, and to chrysanthemums.

The indoor work now looks toward a long series of cultural experiments in the forcing of fruits; collections of apricots, peaches and cherries are ready, and as soon as the proper facilities are at hand the growing of grapes from a commercial standpoint is to be undertaken. One of the smaller greenhouses has been remodelled for a strawberry forcing house to follow up the successful work of last winter, reviewed in Bulletin 134.

Very respectfully submitted,

C. E. HUNN, in charge.

REPORT OF THE TREASURER.

The Cornell University Agricultural Experiment Station, in account with the United States appropriation, 1896-7.

To Receipts from Treasurer of the United States as per appropriation for fiscal year ending June 30, 1897, as per Act of Congress, approved March 2, 1897		Dr.	
			\$13,500 00
		Cr.	
By Salaries.....	\$ 8,043	75	
Labor	1,988	57	
Publications.....	299	60	
Postage and Stationery	251	05	
Freight and Express.....	118	75	
Heat, Light and Water	63	84	
Chemical Supplies.....	147	49	
Seeds, Plants and Sundry Supplies.....	651	37	
Fertilizers			
Feeding Stuffs.....	164	83	
Library.....	108	22	
Tools, Implements and Machinery.....	56	95	
Furniture and Fixtures.....	126	68	
Scientific Apparatus.....	772	82	
Live Stock	301	10	
Traveling Expenses.....	145	88	
Contingent Expenses	10	00	
Building and Repairs	249	10	
			13,500 00

We, the undersigned, duly appointed auditors of the corporation, do hereby certify that we have examined the books and accounts of the Cornell University Agricultural Experiment Station for the fiscal year ending June 30th, 1897; that we have found the same well kept and classified as above, and that receipts for the year from the Treasurer of the United States are shown to have been \$13,500.00, and the corresponding disbursements \$13,500.00, for all of which proper vouchers are on file, and have been by us examined and found correct, thus leaving no balance on hand.

And we further certify that the expenditures have been solely for the purpose set forth in the Act of Congress approved March 2, 1887.

(Signed) H. B. LORD,
 GEO. R. WILLIAMS, } Auditors.

(Seal)

Attest: EMMONS L. WILLIAMS,
 Custodian.

APPENDIX I.

BULLETINS PUBLISHED JANUARY-MAY, 1897.

The Pistol-Case-Bearer in Western New York.....	No. 124
A Disease of Currant Canes.....	No. 125
The Currant-Stem Girdler and The Raspberry-Cane Maggot	No. 126
A Second Account of Sweet Peas.....	No. 127
A Talk About Dahlias.....	No. 128
How to Conduct Field Experiments with Fertilizers...	No. 129
Potato Culture	No. 130
Notes Upon Plums.....	No. 131
Notes Upon Celery	No. 132
The Army-Worm in New York.....	No. 133
Strawberries Under Glass.....	No. 134
Forage Crops	No. 135
Chrysanthemums of 1896.....	No. 136
Agricultural Extension Work: Sketch of its Origin and Progress.....	No. 137

CIRCULARS.

Co-operative Tillage Experiments.....	No. 5
Co-operative Tillage Experiments.....	No. 6

Bulletin 124.

January, 1897.

Cornell University Agricultural Experiment Station.

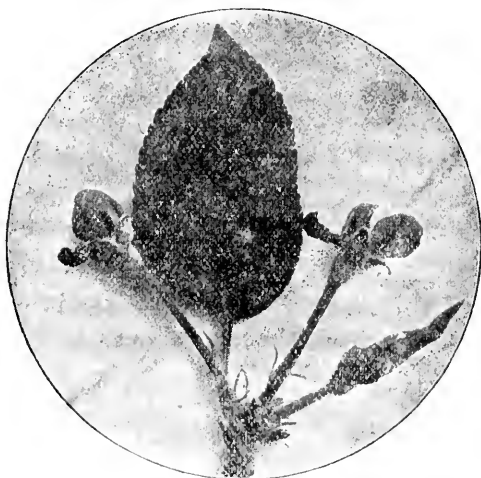
ITHACA, N. Y.

ENTOMOLOGICAL DIVISION.

The Pistol-Case-Bearer

—IN—

Western New York.



By M. V. SLINGERLAND.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Professor I. P. ROBERTS,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.

CORNELL UNIVERSITY, ITHACA, N. Y., January 1, 1897.
THE HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY.

Sir :—The following paper considers another of the many insects which contribute their share towards making fruit-growing a scientific business. The observation of any insect and the study of truthful descriptions of it, are direct means of education ; and the final mastery of it is a means of encouraging and fortifying the farmer in every adversity. This bulletin, therefore, has two distinct merits,—the imparting of immediate information concerning the pest, and the power of inspiring correct and hopeful habits of thought ; it is therefore submitted for publication under Chapter 437 of the law designed to extend the experiment station method and work.

L. H. BAILEY.

THE PISTOL-CASE-BEARER.

Coleophora malivorella Riley.

Order LEPIDOPTERA ; superfamily TINEINA.

Among the most interesting insects that trouble the fruit grower are those known as "case-bearers ;" thus named from the fact that in their destructive stage they are encased in curiously-shaped suits which they wear wherever they go. One of these insects, the cigar-case-bearer, has done much damage in western New York orchards since 1893 ; it was illustrated and discussed in Bulletin 93. During the past year another case-bearer appeared in large numbers in several apple orchards in western New York and proved even more destructive than the cigar-case-bearer. Frequently both kinds of these case-bearers and the bud-moth (Bulletin 107) worked together on the same branch.

In 1896, many New York farmers and fruit-growers became acquainted for the first time with several insects which seemed to have suddenly appeared in their field crops or orchards in destructive numbers. The army-worm, the green fruit worms (Bulletin 123), and the case-bearer under discussion, are illustrations of this fact. To many, these insects were new pests ; and it is a remarkable fact that, although all of them have occurred in our state for many years and have at times been injurious, it has been nearly fifteen years since any of them appeared in sufficient numbers to do noticeable injury.

HISTORY, DISTRIBUTION, AND FOOD-PLANTS OF THE INSECT.

This pistol-case-bearer is an American insect, and first attracted attention in 1877 in a large apple orchard of over 8000 trees in Erie County in Pennsylvania. The owner of this orchard reported that it seemed as if there was one on each bud on almost every tree in the orchard ; the next year the insect was still more destructive, rendering large numbers of trees nearly leafless. Specimens of the insect were sent to Dr. Riley, and in 1879, he published (Ann. Rept. of Com. of Agr. for 1878, p. 253) a brief

illustrated account of the pest, describing and naming it as new to science. Scarcely anything new has been recorded about the insect since. What was doubtless the same case-bearer was recorded from Kentucky in 1878, and was found upon chestnut bark near Ithaca, N. Y., in 1880. In the spring of 1882, the insect did considerable damage in apple orchards at South Byron, N. Y. It did not again attract serious attention in New York state until 1896. In 1891, a few specimens were sent to Dr. Lintner from Lansing, Oswego Co., and Walworth, Wayne Co., and the same year we found some of the cases on a wild cherry tree near the insectary. The insect was reported as occurring in Nebraska and adjoining states in 1894, and we received a few specimens from Sodus, Wayne Co., N. Y., the same year. In 1895, it was found in Canada and in New Mexico. During the past year, the insect did much damage in large apple orchards at Geneva and at Walworth, N. Y. We also received it from Clarkson, Monroe Co., N. Y. It has been recorded from New Jersey as common on apple, plum and cherry.

Thus the insect has quite a wide range of food-plants, including the three orchard fruits just mentioned, and probably the chestnut. It is also widely distributed over the country, occurring from Canada southward through New York and Pennsylvania and westward through Nebraska into New Mexico. It has been injurious only in New York and Pennsylvania. Nothing can be predicted as to its future.

How distributed.—It is claimed that the pest was introduced into the far west on eastern nursery stock. This is doubtless by far the most fruitful source for the distribution of the insect.

ITS APPEARANCE.

On account of its small size and peculiar habits, the insect itself in any stage, will rarely be noticed by the fruit-grower. But one of the curious suits, or cases as they are called, which the little caterpillar wears, is quite conspicuous, thus often revealing its presence to the casual observer.

The caterpillar and its curious case.—The insect is destructive only in its caterpillar stage, and yet the fruit-grower usually sees only the peculiar suit or case worn by the caterpillar. Several of

these curious cases with their inhabitants partly protruding from one end are shown much enlarged at *b, b, b*, plate 1; at *c*, plates 1 and 2, many of the cases are represented, natural size, attached to the branch. The cases are of a dark brown or black color, more or less covered with grayish pubescence from the leaves. Their form is aptly described by the word "pistol-shaped." They are of a tough leathery texture, and evidently made of silken threads interwoven with the pubescence from the leaves, and the whole stained dark in some manner, probably by the excrements of the caterpillar.

How this curious case is made will be described further on in discussing the life history of the insect. When the insect is at work in April, May, or June, these curious pistol-shaped cases are quite conspicuous, and certainly very odd-looking objects, as they are seen projecting at various angles



1.—*Work of the pistol-case-bearer on apple foliage.*
Natural size.

from a flower-bud (frontispiece), from the surface of a leaf, or from the side of a branch (*c*, plates 1 and 2). They are sure to arouse one's curiosity, especially when, after watching one for a few minutes, it is seen to move off to another part of the bud or leaf.

A careful examination of one of these moving pistol-shaped objects will reveal its inhabitant, an orange-colored, black-headed caterpillar about one-fourth of an inch in length.* When dis-

*Technical description of larva.—Length, 6 mm. Color, deep chrome or light orange; the thoracic segments are darker, the first one blackish.

turbed the little creature retreats into its pistol-shaped case and can be induced to come forth only by either tearing open its case, or by continued urging from the rear.

The adult insect.—The moth is a very delicate and pretty little creature. It is represented nearly four times natural size at *a*, *a*, plate 1; the male moth, which is considerably smaller, is shown in the lower of the two figures, and the larger female in the upper figure. They are of a general dark drab color; on the basal third of the front wings white scales predominate in the females, but are sometimes almost entirely lacking in the males. The alternation of the rings of dark and white scales give the antennæ and legs a curious annulated appearance. The basal joint of each antenna in both sexes bears a conspicuous tuft of scales, those of the female being considerably larger.* All of these characteris-

Head, black with a yellow median suture; antennæ, yellow. Thoracic segments each with a blackish, granulate, chitinous spot on the lateral ridge; the mesothoracic segment has besides two similar, narrow, triangular, black, transverse spots, separated by a narrow yellow mesal line near its caudal border, and there is a similar subdorsal black spot on each side near the cephalic margin; the thoracic shield is large, black, and nearly divided by a narrow yellow median stripe. The anal shield is also black. The true legs are black, with the distal segment and the extremities of the other segments yellowish. The four pairs of pro-legs are of the same color as the body, except the anal ones which are slightly darker and have a large black spot near the base of each. The whole surface of the body is granulated, more strongly so on the thoracic and anal segments. A few hairs arise from the head, thorax and anal segment.

This description, taken from full-grown living specimens of the caterpillars differs considerably from Dr. Riley's description in his report for 1878. None of the caterpillars that Dr. Riley had, seem to have been preserved, so that we cannot explain these striking differences.

* In his description of the moth (Ann. Rept. Com. of Agr. for 1878, p. 254), Dr. Riley states that the males have no tuft on the basal antennal joint; he describes the tufts of the females. How this mistake occurred is not known. Mr. L. O. Howard, U. S. Entomologist, writes me as follows: "There are ten specimens of *Coleophora malivorella* in the National Museum collection. Five of these are males and five are females. The tuft on the basal joint of the antennæ occurs in *both* sexes, but is a little longer in the females than in the male. One of these males has lost the tuft entirely and in another is partly gone. It was also completely lost in one of the females.

All of these ten specimens are from the original 1878 rearings. Dr. Riley probably examined the single male which had lost the tuft."

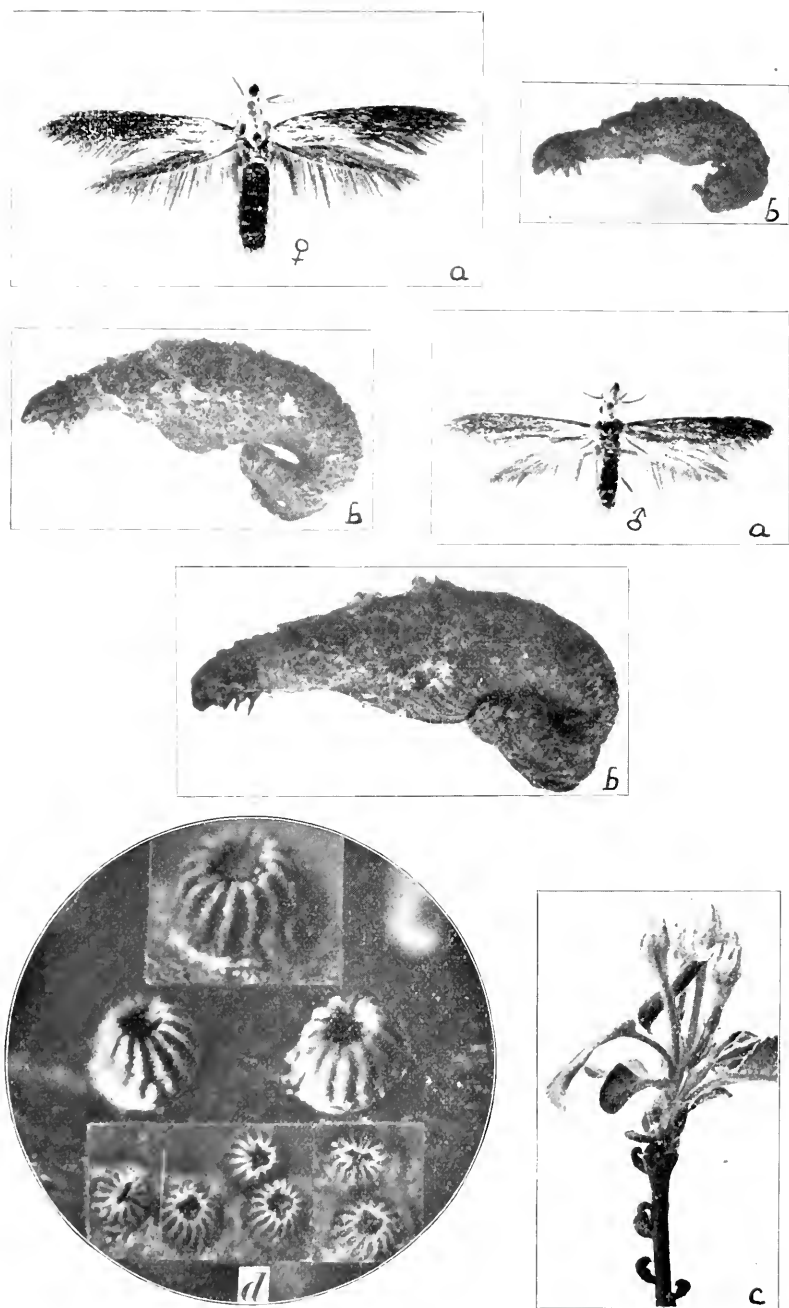


PLATE 1.—*The pistol-case-bearer* (*Coleophora malivorella* Riley). a a, the moth (the upper figure represents the female and the lower one, the male insect), enlarged about four times; b, b, b, small cases with the caterpillars projecting from them, much enlarged; c, an apple branch bearing several of the case-bearers in position for moulting; d, the eggs, very much enlarged.

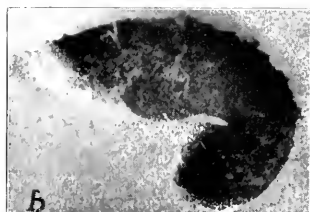
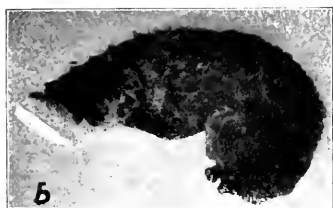


PLATE II — *The pistol case bearer (Coleophora malivorella Riley)*. a, destructive work of the insect on apple blossoms, natural size; b, b, cases showing recent white additions at the ends, much enlarged; c, full-grown case-bearers attached to the branches for pupation, natural size.

tics are shown in the figures at *a, a*, plate 1. The general color of the males is slightly darker, especially the head.

During the day the moths rest on the leaves and branches with their heavily fringed wings folded closely over the abdomen and their long, slender antennae placed close together and projecting straight forward from the head. They may be seen in this position on the trees in June.

ITS NAME.

This case-bearer belongs to the large group of minute moths known as Tineids. Nearly all the Tineids are easily distinguished from the other moths by their narrow wings which are bordered with very wide fringes (see figure *a*, plate 1). The name *Coleophora malivorella*, by which the insect is recognized among scientists the world over, was given to it by Dr. Riley in his report as U. S. Entomologist for 1878 (published in 1879).*

The popular name of "apple coleophora" given to the insect by Dr. Riley was soon superseded by Dr. Lintner's name, "the apple-tree case-bearer." While it is true that it seems to prefer the apple as a food-plant, there are several other case-bearers which feed upon the apple tree, and one of these—the cigar-case-bearer (Bulletin 93)—is even more common and destructive than the one under discussion. We therefore propose the much more definite and descriptive popular name of "the pistol-case-bearer" for the insect. The striking resemblance of the case, which the caterpillar carries about with it, to a pistol makes this popular name especially suggestive to the fruit-grower.

THE STORY OF ITS LIFE AND HABITS.

This interesting little pistol-case-bearer has been under almost

* In Bull. 1, Vol. IV, p. 93 of the U. S. Geol. Survey, published February 5, 1878, Mr. V. T. Chambers described *Coleophora multipulvella*. In 1882, Lord Walsingham placed this species in the synonymy of *C. malivorella*, stating that Chamber's description applied to Dr. Riley's specimens, but that the former's type of *C. multipulvella* was not examined. Should Chamber's type specimen prove to be Dr. Riley's *C. malivorella* the last name must fall, on the ground of priority of publication, and the pistol-case-bearer be called *Coleophora multipulvella*. If Chamber's type is still in existence this point could be easily settled by some one familiar with the Tineids.

daily observation here at the insectary from the time it awoke from its winter's sleep in April, 1896, until it passed through its wonderful transformations into the pretty little moth, from whose beautiful and oddly-shaped eggs the little caterpillars hatched in the fall and soon made their preparations for their long winter's rest. While its life history is similar to that of the cigar-case-bearer (Bulletin 93) its habits are quite different and present several interesting phases of insect life.

How it passes the winter.—In our cages the little creatures began to go into winter quarters as early as August 26th; they were then minute, less than half-grown, orange-yellow caterpillars, encased in very small pistol-shaped suits, which were firmly attached to the bark, usually on the smaller branches. These hibernating cases are about one-half as large as those shown natural size at *c*, plate 1, and they are shaped like the much enlarged case shown at *b* in the extreme upper right-hand corner of plate 1. Where the insect is quite numerous, it may be easily found in its winter quarters.

About seven months of the pistol-case-bearer's life is spent in idleness in its snug little case on the twigs of the trees.

Its spring appearance and habits.—The little caterpillars awake from their long winter's fast very early in the spring, as soon as the buds begin to swell. In 1896, the little cases were loosened from the twigs soon after April 1st, and the march of the hungry caterpillars for the buds began; by April 15th, they were at work in full force on the buds. By eating or boring small holes, scarcely larger than a pin in the swelling fruit and leaf buds, the little creatures did much damage very early in the season. On April 24th, we examined the large orchards of Messrs. Yeomans, at Walworth, N. Y., and found the pistol-case-bearers so thick in one apple orchard that it seemed as though there was one case to every two or three buds on the trees; the buds were just beginning to open.

As the caterpillars continue feeding on the opening buds, they soon find that their winter suits or cases are too small for their growing bodies; and they proceed to build on extensions at both ends and along the lower edge.

Its pistol-shaped suit.—Unlike the cigar-case-bearer (Bulletin 93)

the pistol-case-bearer does not construct an entirely new and larger suit to accommodate its increasing size. It simply pieces on additions to its suit from time to time. In the enlarged cases represented at *b, b*, plate 2, the white portion at the head end is a very recent addition to the case; the right-hand figure also shows a slight addition around the anal orifice. We have specimens of cases which show fresh, white additions all along the lower edge of the case as well as at both ends. These additions seem to be made mostly of silk in which is mixed considerable of the pubescence and *debris* of the leaves, and the whole is glued together to form a tough leathery substance. Although white when first made, the additions soon become stained a very dark brown, perhaps from the excremental or other juices of the caterpillar. After about May 1st, the caterpillars seem to confine nearly all of their extensions to the head end of their suits, thus considerably lengthening the barrel of the "pistol." When complete then, their cases are simply their first winter suit that has been made larger around and longer by additions or patches put on to one side and both ends. Externally the cases or suits present a rough, fuzzy, somewhat untidy appearance, but cut one of them open and take a peep inside. The whole suit is found to be lined with a thin, smooth, whitish, delicate layer of silk which gives the interior a neat, cozy appearance.

The curved end which forms the handle of the "pistol" consists of two flattened oyster-shell-like projections of the suit, which are not joined together along their lower edges, and thus form a slit-like opening that is the back-door to the case. The elasticity of the material and the peculiar curve of this portion of the suit tend always to keep this opening closed. It would require considerable force for an *outside* enemy to open this orifice, though from the inside the slightest pressure enables the caterpillar to protrude its anal segment whenever its excrement is to be voided. This arrangement enables the little caterpillar to keep his snug home neat and clean inside. This back-door also serves another important purpose in the life of the insect, as we shall see later.

Moulting of the caterpillar.—On April 26th, we were surprised to find that most of the caterpillars at work in our cages had securely fastened their cases to the bark of the twigs as shown at

c, plate 1. On May 1st, Messrs. Yeomans, Walworth, N. Y., wrote me that the insects had also done the same thing in their orchard. It seemed hardly possible that they had finished their destructive work thus early, and were preparing to undergo their further transformations. Cases were detached and examined every day, and no explanation was found for the curious precedure until the fourth or fifth day. Then the cases began to move, and at each spot where a case was fastened there remained attached to the bark the anchor, a minute cup or button of silk, and on each of these we found the cast skin of the head of the caterpillar. This meant that the cases had been fastened to the twigs so that the caterpillar could shed off, undisturbed, its old skin that had become too small, and could then come forth clad in a new and elastic skin that had been growing under the old one. All caterpillars moult or shed their skin several times; it is the way they grow. Doubtless the pistol-case-bearer moults at least three or four times during its life as a caterpillar, and perhaps in the way just described. Apparently the moult which occupied the last four days of April, 1896, was the last one; its occurrence in the height of the feeding season rendered it quite conspicuous.

Its feeding habits on the flowers and leaves.—Beginning on the swelling buds, as described on a previous page, the case-bearers continue their destructive work on the opening leaves and flowers. They now feed quite differently from the cigar-case-bearers, which mined out the tissue between the two skins of the leaves. The pistol-case-bearers either devour the whole leaf or all of it but the lower skin and veinlets, thus skeletonizing it, as shown, natural size, in figure 1. The caterpillar never leaves its case, but projects its body out far enough to obtain a good foothold and then begins to eat, holding its case at a considerable angle from the leaf. The cases are thus not attached to the leaf, but move with every motion of the caterpillar as it feeds. While they feed freely on the leaves, they seem to show a decided preference for the opening flowers; this habit makes the insect especially destructive. In the upper part of figure a, plate 2, is shown a cluster of flowers which has suffered severely from the attacks of this little foe. It works mostly on the petals of the flowers, but often eats into the stem and soon kills it. Thousands of prospective fruits

were thus "nipped in the bud" in the orchards where the insect worked. After the opening flowers are destroyed or the petals have fallen, the caterpillars turn their attention to the tender foliage. We placed about a hundred of the little cases on a small tree in the insectary that contained no flower-buds. Nearly every leaf on the tree was soon riddled like those shown in figure 1. The insect thus has more destructive feeding habits than the cigar-case-bearer, but as it feeds openly, and does not mine out its food from the interior of the leaf, it would seem to be easier to reach with a poison spray than the latter.

The pistol-case-bearers continued to feed on the leaves until about May 15th, when most of them migrated to the branches where they securely fastened their cases to the bark. Projecting upward from the branches at an angle of about 45 degrees, these full-grown pistol-cases present a peculiar appearance; this is well shown at *c*, plate 2. So securely are the cases fastened that they often remain on the branches for a year or more, but they are of no further use to the insect after about a month.

Pupation.—After making all secure in the manner just described, the little caterpillar proceeds to prepare for its wonderful transformation to the adult insect—the moth. It first turns around in the case, so that the head is towards the anal opening in the handle of the "pistol." If a case be torn from the bark and carefully cut open about two weeks after it was fastened down, its inhabitant will not be a caterpillar, but a curious light brown, apparently lifeless object—the pupa. This change to a pupa took place about June 7th, in our cages.

The emergence of the moth and egg-laying.—The insect passes from ten to twenty days of its life as a pupa in its old pistol-shaped suit fastened to the branches, as shown at *c*, plate 2. From the curved slit (formerly used as a back-door by the caterpillar) in the under side of the handle of the "pistol," there emerges, from June 17th to the 30th, the adult insect—the pretty little moth described on a previous page and figured at *a*, *a*, plate 1. Thus, the pistol-shaped cases serve as snug warm suits for the caterpillars during their life, and then furnish cozy homes in which the insect undergoes its transformations. Other records give the time of appearance of the moth from the first to the

fifteenth of July, or about two weeks later than our rearings in 1896. This may be accounted for by the fact that the spring of 1896 was a remarkably early one and one also well adapted for the development of insect life; the case-bearers got to work earlier than usual, for the apple buds started nearly two weeks in advance of most seasons.

The moths remain at rest on the leaves during the day, doubtless feeding but little, if any, and doing no damage. Although dozens of moths emerged in our cages during the latter half of June, we found no eggs until July 13th. But the next day, hundreds of them had been laid all over the sides of the cage and on all parts of some apple branches therein. Further observations in the field showed that they were glued fast at their base usually to either the upper or lower surfaces of the leaves. Apparently no one had ever seen the eggs of this case-bearer before, for nothing has been recorded about them.

The eggs are of a cinnamon-rufous color, and are very pretty objects when seen under a microscope. Although they are only .42 mm. (.016 of an inch) in diameter at their base and about .27 mm. (.01 of an inch) in height, they can be seen with the naked eye when one knows where to look and what for. With our micro-camera we succeeded in getting some much enlarged pictures of these curiously shaped eggs; the photographs are reproduced at *d*, plate 1. As the figures show, the eggs remind one of inverted tea-cups with strongly ridged sides. Many fine transverse ridges connect the larger ones, and the deep cavity at the upper end of the egg is quite irregular in shape. They are very different from those of the closely allied cigar-case-bearer. Although a few recently-hatched caterpillars were seen July 14th, most of the eggs did not hatch until a week later; the egg stage thus last about a week in July.

Habits of the recently-hatched caterpillar.—Unlike the cigar-case-bearer, the newly-born caterpillar of the pistol-case-bearer is not a miner, and also begins the construction of its suit soon after it begins to eat. It first eats into the underside of the leaf, making a hole about the size of a pin's head nearly through the leaf. During this first meal, the little caterpillar apparently weaves together with silken threads some of its excrement and a few of

the leaf-hairs, and thus forms around its body a tiny cylindrical case or suit. We have several of these cases that were made July 22, 1896. The caterpillars continue to eat holes in the leaves during July and August, making additions to their suits from time to time and gradually giving them the pistol-shape.

Preparations for winter.—On August 26th, several of the little case-bearers in our cages migrated from the leaves and fastened their cases to the bark of the apple branches. These cases were of the same shape as those shown at *c*, plate 1, but about one-half as large. Doubtless most of the caterpillars stop feeding and fasten their cases to the branches before September 15th. In these snug, warm, and secure quarters the insect passes the winter.

Briefly summarized, the life-history of the pistol-case-bearer is as follows: The insect spends about seven months (from September 1st to April 1st) of its life in hibernation as a minute, half-grown caterpillar in a small pistol-shaped case attached to a twig. In the spring the caterpillars attack the swelling buds, the expanding leaves, and especially the flowers (frontispiece, and figure *a*, plate 2). About May 1st the cases are fastened to the twigs (Fig. *c*, plate 1) where they remain for four days, during which time the caterpillars shed their skin or moult. They do not make any complete new suit as they grow, but are content with making additions (Figs. *b*, *b*, plate 2) to the ends and side of the old suit. They are not miners, but feed openly, eating irregular holes in the leaves, often skeletonizing them. They are most destructive on the flowers where they eat the petals and stems. In the latter part of May, they cease feeding, securely fasten the cases to the branches (Fig. *c*, plate 2) and in about two weeks, change to pupae within. The moth (Figs. *a*, *a*, plate 1) emerges in two or three weeks, and soon glues its minute, pretty, cinnamon-colored, inverted cup-like eggs (Fig. *d*, plate 1) to the surfaces of the leaves. The egg-stage lasts about a week, the little caterpillar emerging about July 22d. They begin eating little holes in the leaves, and during their first meal construct of silk and excrement a small case or suit for themselves. They continue feeding on the leaves, adding to their suits from time to time, until about September 1st, when they begin to migrate to

the twigs and there fasten their little pistol-shaped cases to the bark. The winter is passed in these snug, warm, secure quarters.

NATURAL ENEMIES.

We have not met with any natural enemies of this case-bearer. However, in 1879, Dr. Riley recorded that "the only enemy of this insect, so far as known, is a minute Chalcid fly, which has increased to such an extent since the ravages of the case-bearer became apparent on Mr. Fairweather's place (Erie Co., Penn.) that it bids fair to render additional remedies unnecessary. The specimens sent in 1877 were not parasitized. Those sent in 1878 were about half of them affected, and of twenty-four specimens received in March, 1879, seventeen had been destroyed by this little fly."* It is to be hoped that this little enemy will soon find a congenial home in the western New York orchards where the pistol-case-bearer is so numerous.

HOW TO COMBAT THE INSECT.

It is practicable to fight this case-bearer in its caterpillar stage only; and it is then so well protected in its case as to render its destruction dependent upon very thorough work.

It is very doubtful if any spray will reach the insect in its snug winter quarters. Extensive experiments have shown that the cigar-case-bearer, which winters in a similar manner, cannot be checked by a spray at this time. The only time when the pistol-case-bearer can be effectively reached is when the caterpillars are actively feeding in the spring. As they feed openly upon the buds, leaves, and flowers, and do not *mine* like the cigar-case-bearers, a poison spray thoroughly applied on their feeding grounds should kill many of them.

We have had no opportunity of carrying on any experiments against the insect, but Messrs. Yeomans, Walworth, N. Y., have given us the results of their efforts to check its ravages. The fact that many cigar-case-bearers and bud moths were doing much damage on the same trees where the pistol-case-bearer was at

* Mr. L. O. Howard, U. S. Entomologist, writes me that this Chalcid is a species of *Pteromalus*, probably undescribed. He also states that the pistol-case-bearer has a secondary parasite; it is Riley's *Cirrospilus flavicinctus*, described in Dr. Lintner's First Report, p. 159, as a primary parasite of *Bucculatrix*.

work, rendered it difficult to make any definite estimates of the results of spraying for the latter insect. Where the pistol-case-bearer was most numerous, they sprayed some of the trees twice before the blossoms were fully open, with Bordeaux mixture and London purple. On May 1st, Mr. L. T. Yeomans wrote us: "We may be mistaken, but it seems to us that we have not so many cases on our trees, where we have sprayed the second time." Kerosene emulsion was also tried when the insects were feeding in the latter part of April. A barrel of the emulsion was sprayed upon five trees, but Mr. L. T. Yeomans reported on May 11th, that he was unable to perceive any difference in the effect on the worms between trees thus sprayed and those unsprayed.

These experiments and our study of the habits of this pistol-case-bearer lead us to believe that it can be kept in check by *thorough* work with a Paris green spray, using one pound to 105 or 200 gallons of water, or Bordeaux mixture. The experience of Messrs. Yeomans indicates that it will require two applications of the poison before the blossoms open to effectually check the pest where it is very numerous. It would be well to combine the poison with the fungicide, Bordeaux mixture, in one of these sprayings, perhaps the second one, as this is the time when the apple scab fungus should receive its first check. This period between the swelling of the buds and the opening of the flower is also just the time when the bud moth and the cigar-case-bearer (which often work with the pistol-case-bearer) should be treated to a poisonous dose. As all three of these insects do their most destructive work before the blossoms open, an especial effort should be made to spray more thoroughly than usual. Do not wait until after the blossoms have fallen before striking a blow at these pests; although many of the pistol-case-bearers could doubtless be poisoned by a thorough application of the Paris green made just after the petals fall, which is also the best time to spray for the codlin moth or apple worm.

Never spray a fruit tree when it is in blossom. Remember that your success in fighting the pistol-case-bearer, and any of the other insects just mentioned, will depend almost entirely on how thoroughly the spraying is done.

MARK VERNON SLINGERLAND.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

BOTANICAL DIVISION.

A Disease of Currant Canes.



Fay Currant.

I do not consider
 was a sprawling tender
 the currant a decid
 "One might
 of the tendency
 limb, and need
 the Champion
 bush-
 ing I have a row
 side of the row,
 six
 feet apart. Strip
 enough
 up to hold the curr
 in this way they do
 with lice this year,
 them?—E. W. L., N.

Reliable Currants.

as it blooms late, prod
 ries on long bunches,
 than any other, and
 est is the old Red Dut
 s disappointed more peo
 'he last twenty years.
 y well in sheltered loca
 g frosts. It is a gene
 currants, Lee Prolific
 the well-known s
 perior; but don't
 it is a worthless thing.—*Nick Hort Society*.

By E. J. DURAND.

PUBLISHED BY THE UNIVERSITY,

ITHACA, N. Y.

1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	Trustee of the University.
Professor I. P. ROBERTS,	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.
125. A Disease of Currant Canes.

CORNELL UNIVERSITY, Ithaca, N. Y., Feb. 1, 1897.

THE HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY.

Sir: The following account of a currant disease, of which almost nothing has heretofore been known, is submitted as a bulletin under provision of Chapter 437 of the laws of 1896. This cane-blight is probably more widespread and serious than anyone has suspected, and it would not surprise us if it should be found that much of the trouble with currants which is laid to hard winters and poor soil is really the result of the work of this fungus.

L. H. BAILEY.

	PAGE.
I. General character of the disease, - - - - -	23
II. Botanical character of the disease, - - - - -	25
III. Remedies, - - - - -	38



A DISEASE OF CURRANT CANES.

I. GENERAL CHARACTER OF THE DISEASE.



3. Diseased currant canes, natural size (a, Tubercles of *Tubercularia*; b, clusters of perithecia of *Nectria*; c, clusters of perithecia of *Pleuroctria*).

During the last few years there has existed, in various portions of New York state, a disease of currant bushes, which has been more or less destructive to the currant industry. The trouble was first called to the attention of the Experiment Station staff in June, 1895, when a diseased bush was received at the Botanical Department from Portland, Chautauqua county. Outside of this locality its effects have since been observed by the present writer at Canandaigua, Ontario county, and in the gardens of the Horticultural Department of Cornell University, in Tompkins county. It has also been noticed by Professor G. F.

Atkinson in St. Lawrence county. Outside of New York state it has been reported from New Jersey by Dr. B. D. Halsted.

Inasmuch as the disease seemed to be a destructive one its study was thought to be of interest and importance. It was de-

terminated, therefore, that the writer should visit the locality of the trouble in Chautauqua county to observe its effects upon the currant bushes, and to obtain material for study. Accordingly, on the 26th of June, 1895, the fruit-farm of Mr. I. A. Wilcox was visited, and notes taken upon the disease as it appears in the field.

Effects of the Disease.

The currant plot was found to be about one acre in extent. It originally consisted of several acres, but the death of the plants reduced it to the present size. About two-thirds of the bushes in the area at the time of the visit were either dead or manifestly diseased. The plants which had died the previous year were replaced in the spring of 1895 by new plants, which at this time were apparently unaffected.

The first effects of acute disease in the plant are seen in the wilting of the foliage, and the premature coloration of the fruits. The leaves turn yellow, dry up and fall away. The fruit clusters on affected plants are usually much smaller and more thinly fruited than on healthy ones, while the berries are colored prematurely, shrivel and fall away with the leaves, so that the canes are barren (Fig. 2.) The latter then die rapidly and soon dry up. Frequently the central canes of the bush die in the manner described, while the outer ones still retain their leaves. In nearly all such instances, however, the leaves of the living parts show indications of disease. Sometimes the plants die before the leaves unfold, so that the unopened flower and leaf buds may be seen upon the dead branches. In the worst cases, where all the canes are dead, the roots also die. Occasional instances were noted where fresh sprouts had been sent up around the base of the diseased canes.

Cuttings made from apparently healthy bushes in this plot were unusually slow in growth, many of them not starting at all. Those which did start were very backward and amounted to but little. Two-year-old plants were also backward and slow in growth. The action of the cuttings suggests that the mycelium of the disease may be perennial in the tissues of the host plant, or, at least, that the vitality of the branch may be impaired before the effects of the disease begin to be noticeable.



2. *Diseased currant plant, showing dead canes and shriveled fruit.*

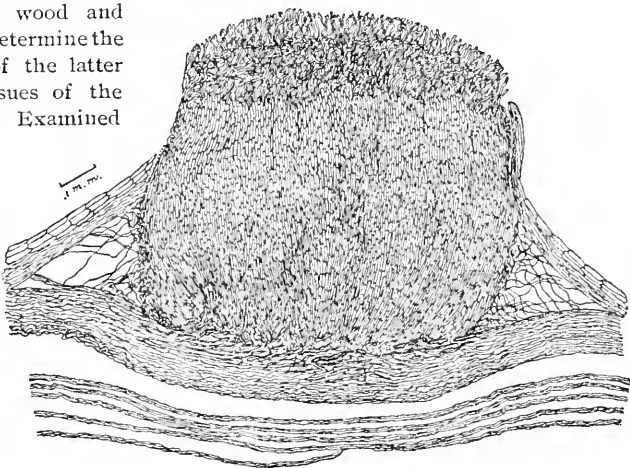
II. THE BOTANICAL CHARACTER OF THE DISEASE.

The Fungus.

On a great majority of the dead canes the pink tubercles of a fungus of the genus *Tubercularia* were present (Fig. 3, *a*). They occurred most abundantly near the base of the stalk, but occasionally were found high up on the stem. Very few bushes were seen which had no tubercles on any of the canes. Sometimes they were present on much diseased stems not completely dead. In no case were they present on healthy plants. The tubercles were sufficiently abundant and so distributed on the diseased and dead stems as to render it probable that the fungus produced the disease and caused the death of the plants. A careful search was made for perithecial forms, but they were found on only a single plant. These with several specimens of the *Tubercularia* were collected for study.

An examination showed the tubercles to be the fruiting bodies of a well known species, *Tubercularia vulgaris*, Tode. Careful sections were made through the wood and tubercles to determine the connection of the latter with the tissues of the host (Fig. 4). Examined

under the microscope, one of these sections shows that the vegetative part of the fungus consists of a delicate thread-like mycelium spreading abundantly through the

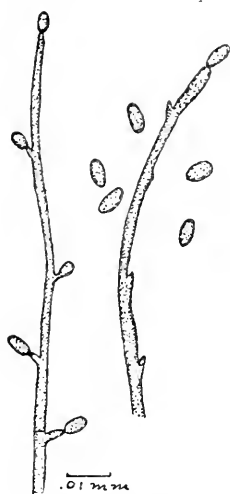


4. Longitudinal section of a tubercle of *Tubercularia*.

tissues of the currant stem. The depredations are confined to the younger tissues of the host, within which it forms a wide web between the cells. It thrives well in the inner bark or cambium layer, thus cutting off the nutriment and causing the death of the plant. The cells affected by the mycelium are much disintegrated and turn brown.

The hidden mass of mycelium coursing through the tissues is the part that is destructive to the currant plant, since this is the only portion of the fungus that absorbs nutriment. The pink tubercles are the fruiting organs of the fungus. In their formation numerous threads of the mycelium turn outward from the bark as a bundle of closely compacted parallel filaments. As

growth progresses outward the mass breaks through the epidermis of the host, and appears as a pink cushion on the surface of the stem. A longitudinal section through one of these when examined under the microscope presents the appearance represented in the figure. The long, spreading mycelial threads may be seen coursing through the layers of the bark forcing the cells apart. In the tubercle itself the threads are broader and much septate by cross partitions, so that the mass thus formed resembles a tissue composed of narrow elongated cells. Toward the top of the tubercle the filaments are more compacted and thread-like. At the surface they become separated from one another and sparingly branched, each bearing small spores or conidia at its apex, and on very short branches or stigmata along its



5. *Hyphae of Tubercularia bearing conidia.*

sides (Fig. 5). These conidia are exceedingly small measuring only 6-8 μ long by 3 μ wide. They are narrowly elliptical in outline and colorless. Immense numbers of conidia are borne on each tubercle, and, being so small and easily detached, are scattered widely by the wind, thus forming a very efficient means of spreading the disease. Each conidium is capable of germinating under favorable conditions of temperature and moisture. The slender tube thus produced enters the tissues of the host, where it elongates and branches producing an abundant mycelium.

The perithecia found on one of the canes were not fully mature, but were sufficiently so to admit of the determination of the species as *Pleonectria berolinensis*, Saccardo. This was afterward found to be a separate fungus in no way connected with the *Tubercularia*. All of the canes collected on the trip were planted in the leaves and humus in one of the nearby ravines, in the hope that more of the perithecial forms would be produced.

The History of the Fungus.

The *Tubercularia vulgaris* is a very common fungus which has long been known as a saprophyte growing on dead and decaying branches. Nearly all of the deciduous woody plants are numbered among its hosts, the genus *Ribes*, to which the currant belongs, being a favorite in this respect. It has passed under many names according as the forms on the various hosts were regarded as belonging to the same or distinct species. In 1865, Tulasne (*Selecta Carp. Fungorum*, III), united all these forms under the old name *Tubercularia vulgaris*, Tode, and gave numerous drawings and facts to prove its connection as an imperfect stage with the very common ascomycetous species, *Nectria cinnabarina*, (Tode) Fr. That this connection exists is evident, so that the fact has since stood unquestioned. In regard to the

special relation existing between these fungi and the currant, Dr. M. C. Cooke wrote for the Gardiner's Chronicle of Feb. 28, 1871, a short paper entitled "A Currant Twig and Something on it." Here were described in a popular way the pink cushions of *Tubercularia*, the mycelium, and the connection of this form with the globular, compound heads of the perfect stage *Nectria cinnabarina*. The plant described in this paper was found on a dead currant branch pulled out of a brush pile.

Its Occurrence as a Parasite.

Most of the writers treating of *Nectria cinnabarina* have spoken of it in a general way, as a saprophyte growing on dead or decaying woody plants. It has long been known, however, that both the *Tubercularia* and *Nectria* may thrive upon living plants in a truly parasitic manner. In Germany this condition seems to be not uncommon. As early as 1880, Dr. H. Mayr¹ studied the fungus as it occurred on living horsechestnut, maple (*Acer platanoides*), and linden, besides noting it upon elm, *Spiræa* and *Prunus*. In the case of the maple the spores germinated upon the cut end of a branch of a young tree, sometime during the year 1880. The mycelium spread to the main stem killing a portion of it. Here the first tubercles appeared, probably in the fall of the same year. During 1881, the new wood was seized upon and killed, so that in the autumn of the same year the leaves withered and died. At this time perithecia appeared on the tubercles of the previous fall. The same writer also studied the development of the fungus, describing and figuring the germination of the spores, and the conidial and perithecial forms. In 1893 and 1894, Wehner studied some peculiar developments of *Nectria cinnabarina* on linden,² *Carpinus*,³ and *Juglans regia*.³ J. Behrens,⁴ also, found the fungus parasitic on *Abies balsamea*. In the summer of 1896, Mr. B. M. Duggar, of the staff of this Station found the same fungus growing in a truly parasitic manner on a pear tree at Fayetteville, Onondaga County, N. Y.

The first mention of *Nectria* as a parasite of currants seems to be that of Dr. Halsted, who speaks of it as follows :⁵ "In the currant regions of the state, particularly around Hilton and Irvington, there has been complaint of a blight affecting the canes of the currant. . . . An affected plant may often be detected by the wilted foliage and premature coloration of the fruit. In some instances only a single cane in the bush may be attacked, while in the worst specimens the whole shrub is dead, except the fresh sprouts which may have arisen from the base of the plant. In early

¹ Ueber den Parasitismus von *Nectria cinnabarina*. Unters. a. d. forst-botanischen Institut zu München 3 : 1-16, 1883.

² Zum Parasitismus von *Nectria cinnabarina*. Zeitschrift f. Pflanzkrankheiten. 1894 : 74.

³ Einige weitere Beiträge zum Parasitismus von *Nectria cinnabarina*. Id. 1895 : 268-276 Pl. V.

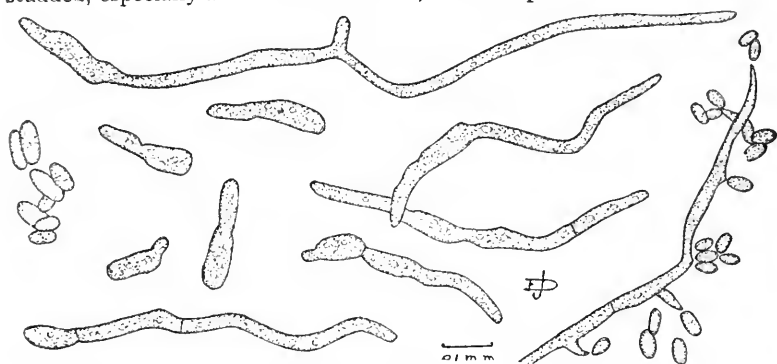
⁴ Ein bemerk. Vorkommen v. *Nectria cinnabarina*, und verbreit. weiss. d. Pilze. Id. 1895 : 193-198.

⁵ New Jersey Ag. Exp. Station, Report for 1894, : 327.

July the blighted twigs often have their bark ruptured, and through the rifts there is to be seen a somewhat brick-colored fungus growth. Upon examination with the compound microscope, this red development is found to be the spore-bearing organs of a highly organized fungus belonging to the genus *Nectria*. This genus is not an unusual one among the fungi that are harmful to higher plants. . . . The one upon the currant, when it seems to be deeply seated and does much damage, is nearly related to the *Nectria cinnabaria*, Tode, which is common on various trees." The effects of the disease in New Jersey are thus seen to be nearly identical with those observed in Chautauqua County.

Cultivation of the Tubercularia.

On November 16th, 1896, another package of diseased currants was received from Mr. Wilcox. The canes were badly affected, being thickly studded, especially about the lower ends, with the pink cushions of *Tuber-*



5. *Germinating conidia of Tubercularia. Portion of mycelium producing secondary conidia.*

cularia. The stems were covered and allowed to stand for a day in a moist place, so that the cushions were well moistened and swollen out. In order to avoid contamination as much as possible the spore-bearing tops of several of these cushions, after being shaved off with a sterilized scalpel, were crushed in boiled water on a flamed glass slip. Vast numbers of conidia were present. Dilution cultures of these were then made in acidified potato-agar in the usual manner. This was done in order that the germination of the conidia, and the development of the mycelium in artificial culture media might be studied. After twenty hours the spores had begun to germinate freely. The various stages of germination are illustrated in Figure 6. In this process the spore first swells to more than twice its original size through the absorption of moisture. A small protrusion then appears at one or each end of the conidium, which grows in length as a germ-tube. These tubes are quite large in proportion to the size of the spore, so that as growth pro-

gresses the original spore is soon lost sight of. In most cases the germ-tubes are soon cut off by septa. The protoplasm is at first nearly homogeneous, but soon becomes vacuolate in the older portions of the tube. After having elongated considerably the thread becomes sparingly septate by the formation of cross partitions. In old cultures the older parts of the mycelium are much septe and filled with vacuoles. The threads soon begin to branch, until finally a spreading mass of densely interwoven mycelium is produced.

In threads thirty-six hours old, numerous small, short protrusions appear along the sides of the threads near the ends. These at first resemble incipient branches, but are usually of considerably less caliber than the main threads. They are as often curved as straight. When the bud is a little longer than the diameter of the main thread, a constriction appears near its base, so that the apical portion soon separates as a secondary conidium (Fig. 6). The base then grows out, so that other conidia are thrown off from the same point in a similar manner, until small clusters are present along the sides and apex of the main hypha. In old cultures these secondary conidia are present in immense numbers. As represented in the figures, the primary and secondary conidia are borne in precisely the same way along the sides and at the apices of hyphal threads. Being alike also, in size and shape, they differ only in that the primary conidia are produced on more or less erect hyphae, arising from the summits of the compact pink cushions formed by the coalescence of hyphal threads. The secondary conidia, on the other hand, are borne on separate hyphae, arising directly from the spores, and thus not forming a compact stroma. Morphologically, however, the two fruit forms are exactly alike.

Many cultures of the conidia of *Tubercularia* have been made, in all of which the mode of germination and production of secondary conidia were as described in the preceding paragraphs. Many of the cultures made from fresh material were more or less contaminated by the presence of bacteria or other fungi. In one set, however, plates two and three were pure, being thickly beset with numerous colonies of the *Tubercularia* alone. From plate three of this series transfers were made with a flamed needle to tubes of sterilized bean stems and potato-agar. At this time the colonies were about four days old, and secondary conidia were present in great numbers. Pieces of agar containing colonies were also transferred to sterilized currant stems in an Ehrlenmeyer flask.

On the potato-agar growth was rapid and profuse. The surface of the medium was soon covered with a felty growth, many of the hyaline threads extending far down into the mass. On the bean stems, also, the growth was rapid. The surface of the liquid was covered with a hyaline, felty growth, from which many of the threads projected downward as in the agar. The growth on the stems was sparse consisting of a thin web of hyphae covering the substratum, and forming white flocculent tufts at the ends of the stems. After eleven days growth numerous small, hemispherical heaps or cushions began to appear on the bean stems at various points. These, at first, were

simply little tufts of threads about the size of a pin-head, but later they increased to several times that size. They were then pure white, somewhat compacted, and cottony in appearance. When examined under the microscope, these cushions were found to consist of erect parallel hyphae, much like fertile threads, but no conidia have yet been detected upon them.

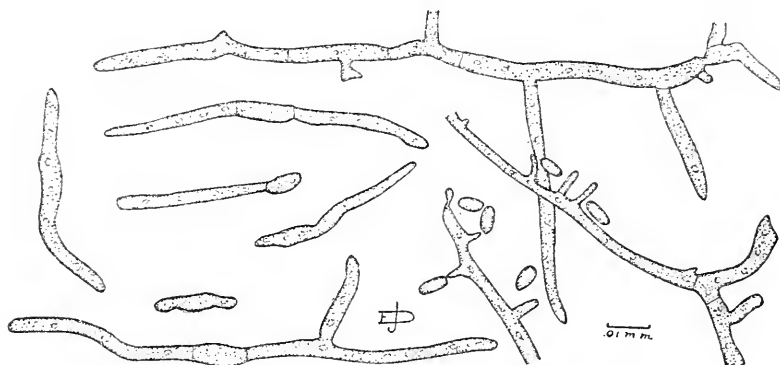
On the currant stems in the Ehrlenmyer flask growth was at first slow. In a few days, however, a long sparse growth of mycelium could be seen spreading thinly over the surface of the stems. In a short time the mycelium became somewhat flocculent in spots, especially at the cut places where branches had been removed from the stems. After fourteen days growth, the white cushions began to be formed, especially at the cut surfaces mentioned. In appearance these were exactly like the ones described on the bean stems. When old they became yellowish, and closely compacted into a stroma, which was slightly pinkish within. Several instances have been noted in which a swelling or protrusion appeared at the summit or side of one of the white cushions, and which seemed at first to present every indication of a forming perithecium. It was soon found, however, that the protrusion was simply a true, pink stroma of *Tubercularia*, resembling in nearly every respect those found in nature. Conidia were present in great numbers at the summit of the mass. In the flask, also, on the felty mass covering the surface of the currant leaves and liquid at the bottom, small pink tubercles have arisen, which in many respects resemble those found on the currant stems in nature.

It may be mentioned at this point, that in none of the artificial cultures has there appeared any indication of the fruit-bodies described by Mayr⁶ as macroconidia. These were said to be long, fusoid, several-septate bodies, borne on tufts of white mycelium, at points where the stromata of *Tubercularia* later appeared. The macroconidia after germination produced secondary macroconidia of a similar form, by budding-off from the mycelium. It was thought at first, that the white cushions mentioned in the last paragraph might represent these macroconidial stromata, but a careful search has failed to reveal any fruiting-bodies of such a form. The fact that no such bodies appeared in the carefully made pure cultures, together with their very marked similarity to the conidia of a very common saprophytic fungus of the genus *Fusarium* has raised the suspicion that perhaps the macroconidia may have belonged to another fungus not connected with *Tubercularia*.

In order to determine the function of the secondary conidia thrown off from the mycelium growing in agar, dilution cultures were made, that they might be obtained in pure cultures. This was done by transferring a portion of a *Tubercularia* colony, containing numerous secondary conidia, to three agar tubes successively and pouring into plates in the ordinary manner. Plate number one was then examined under the microscope, and the position of the conidia marked on the glass. After twenty-two hours these

⁶Untersuch. a. d. forst-botan. Inst. zu München. 3 : 1-16, Pl. I, figs. 18-21.

marked spores were found to have germinated in a manner similar to that described for the primary conidia taken from the pink tubercles. The spores first swelled to several times their former size, when germ-tubes were pushed out from the sides and ends (Fig. 7). The protoplasm was granular and filled with vacuoles. Septa appeared early, cutting off the tubes at their points of origin. After forty-eight hours growth, the mycelium was found to be much branched, quite dense, and not widely spreading. The main hyphae had put out short branches quite simultaneously along their sides, so that the lateral branches were of nearly equal length. After fifty-six hours these branches were throwing off secondary conidia precisely as the mycelium from the primary conidia had done (Figs. 6 and 7). It will be seen, therefore, that the primary and secondary conidia behave almost exactly



7. *Germinating secondary conidia of Tubercularia.*

alike in their germination, and in their production of fruiting bodies. This is no more than might be expected when we remember that the two forms are morphologically similar.

The behavior of these colonies varied much with the food supply. In plate number one, after the nutriment had become nearly exhausted on account of the large number of colonies present, the mycelial threads became very profusely and compactly branched, forming close colonies. The protoplasm became full of very large vacuoles. In plates number two and three, where the nutriment was more abundant, the threads were much longer, more slender, and less branched, thus forming a more spreading colony. The protoplasm was nearly homogeneous with few vacuoles.

On March 14, 1896, colonies produced from secondary conidia were inoculated on sterilized currant stems, neutral bean stems and acid bean stems. Here again the growth was similar to that described for the primary conidia. The mycelium grew slowly, but after three days, formed a thin web over the stems. After four or five days the small white cushions began to form and increase in size, in nearly every respect resembling those previously described.

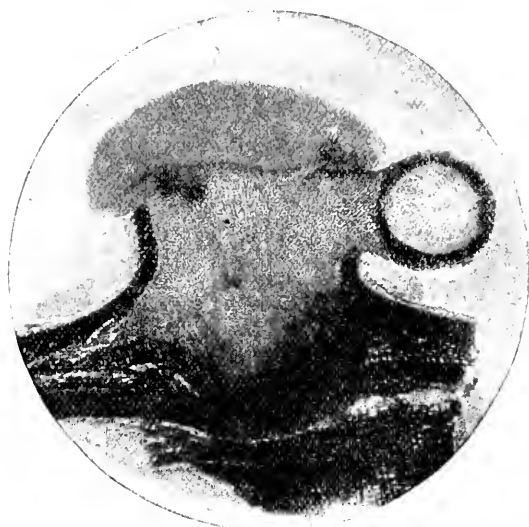
The various cultures and inoculations detailed in the preceding paragraphs were made in the hope that it would be possible, finally, to trace in artificial cultures the exact relation and connection existing between the *Tubercularia*, and the perithecial forms of *Nectria* and *Pleonectria*. It may be said, however, that at the time of the present writing, after a lapse in some cases of many months, nothing but the stromata of *Tubercularia* has appeared in the cultures. In explanation one might cite Mayr's observations on the maple (see p. 27). In this case the perithecia did not appear until a full year after the stromata had been formed. It is known, too, that many forms require a much longer time than this to attain to their complete development under artificial conditions. The methods of culture may not have been

favorable to the production of the perfect form. It is known that many species require a period of rest before such forms will be developed. That a connection exists between *Tubercularia vulgaris* and *Nectria cinnabarina* has been abundantly demonstrated, so that the fact is no longer open to question (Mayr, l. c.)

Nectria cinnabarina.

All of the perithecia developed during the fall of 1895, on the currant bushes planted in Fall Creek Ravine, were those of *Pleonectria*, which is not connected with *Tubercularia* as is shown in a succeeding paragraph.

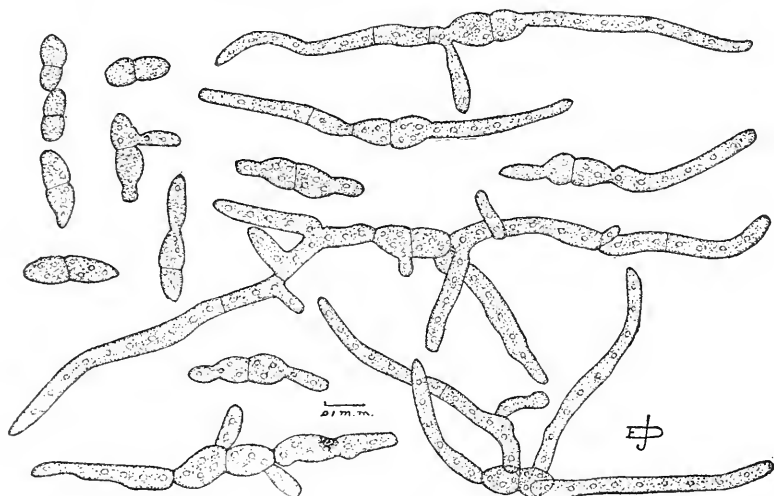
The canes were examined at intervals during the fall and winter of 1895-96, but it was not until February that a branch was noted, on which clusters were present, which differed decidedly in appearance from those previously observed on this material (Fig. 3, b.) The perithecia were a light brick-red in color, were small, spherical, and densely crowded, and covered with little granules, giving them a rough appearance. There was no depression at the apex as in *Pleonectria*. The clusters were seated on prominent stromata, evidently those of *Tubercularia* (Fig. 3, b and 9.) The tubercles and perithecial clusters were intermingled freely. Many tubercles



9. Longitudinal section of a stroma and single perithecium of *Nectria*.

were present, from the bases and sides of which the perithecia were projecting. All gradations could be seen, from the simple tubercles covered with conidia, through those bearing one or several perithecia, to those entirely covered by clusters. Conidia were present on all of these stromata.

A microscopical examination showed, as was suspected, that the fungus in question was none other than *Nectria cinnabarina* (Tode) Fr. If a perithecium be split longitudinally an appearance represented in Figure 9 is produced. It consists of an outer shell composed of coalesced threads. Springing from the bottom of this are numerous club-shaped sacks or *asci* which converge toward the apex of the perithecium. Each ascus contains eight elliptical spores which are divided into two cells by a cross-wall near the middle. They measure $12-15 \times 5-7 \mu$.



10. *Germinating spores of Nectria.*

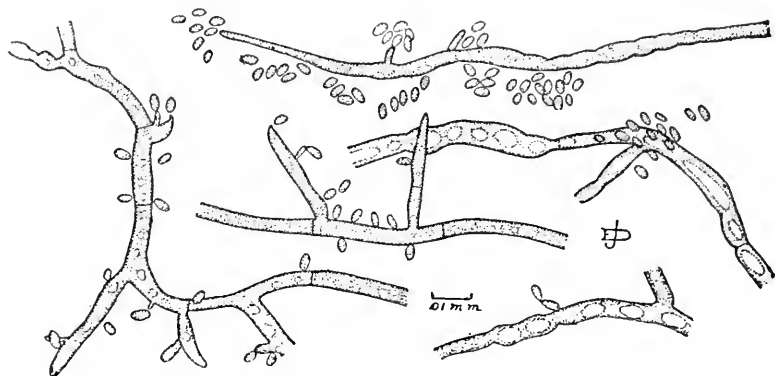
Cultures of the mature spores were made in acidified potato agar. The upper part of a cluster of perithecia was cut off with a flamed knife, the contents crushed out in boiled water, and dilutions made in the ordinary way. The plates were kept at the room temperature, 70 to 80 °F. The spores swelled and germinated after twenty-two hours. In nearly every instance both cells of the spore germinated, each sending out one or two germ-tubes (Fig. 10). The tube more often originates at the end of the spore than at the side. There is often a more or less prominent constriction of the germ-tube at the point where it leaves the spore.

At this time no septa were present, the protoplasm of the tube being continuous with that of the spore, and faintly vacuolate. After twenty-eight hours branching had begun and a few septa formed. From this time growth advanced rapidly until the threads had branched into a spreading myce-

lium. After three days, the protoplasm became full of vacuoles placed at regular intervals. At this time conidia began to be thrown off from short lateral branches in a manner similar to that previously described. They were 4—5 μ long, or about the size of those of *Tubercularia* (Fig. 11).

When the cultures were four days old small portions of the agar containing colonies were transferred to sterilized currant and bean stems. The mycelium spread from the point of inoculation until a sparse cottony growth appeared over the stems, especially at the cut ends. Development was more vigorous on the currant than on the bean stems. After nine days growth minute white cushions began to be formed on the surface of the stems. These increased in size, and resembled in every way those previously described for *Tubercularia*. No perithecia have yet been produced in artificial cultures.

Cultures were also made of the conidia produced on stromata from which perithecia were borne. The germination, mycelial growth, and white cush-



11. Mycelium of *Nectria* producing secondary conidia.

ions produced resembled exactly the like phenomena in the case of *Tubercularia*.

Pleonectria berolinensis.

Reference has already been made on a previous page to the perithecia of *Pleonectria berolinensis*, Sacc. found on one of the currant canes brought from Chautauqua county. This species has long been known as an inhabitant of dead currant stems both in Europe and America. In North America it is said to occur on dead stems of *Ribes*, in Canada and the Northern United States, west to Montana.

No reference to this fungus as a parasite has been found. At the time the specimen was collected it was thought that perhaps the species might be another perfect form connected with the *Tubercularia*. The evidence, however, is against this view.

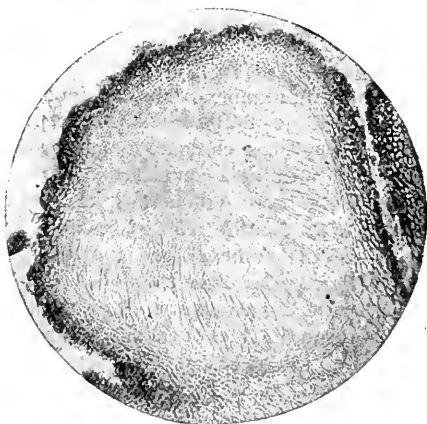
The currant bushes which had been placed in the ravine, as described on page 26, were left undisturbed during the summer and fall of 1895. About September first, perithecia began to appear abundantly near the bases of the

stems. By October first, many of the branches had produced large numbers of the fruit-bodies with mature spores (Fig. 3, c.). These resembled in



13. Longitudinal section of a cluster of perithecia of *Pleonectria*.

nearly every detail the specimens of *Pleonectria berolinensis*, Sacc. in Ellis and Everhart's North American Fungi, No. 470. The perithecia are minute, smooth, spherical or pear-shaped bodies, and are usually borne in clusters closely crowded together. The color is brick-red or reddish-brown, bright when the plants are fresh, but duller when dry. Each cluster is usually seated upon a more or less distinct stroma, but seldom, if ever, is this a cushion of *Tubercularia*. Most of the specimens examined seem to be nearly sessile upon the wood, but an evident stroma is shown in Fig. 13. The clusters originate beneath the bark, but as they grow older and larger, they break through and appear on the surface, bordered by the ruptured edge of the epidermis. Occasionally, several clusters are joined side by side, forming a ring extending nearly around the stem. In some instances, when the bark had been torn away, the perithecia are not clustered, but entirely distinct and superficial on the wood. In such cases there is no evidence of an underlying stroma, certainly none of *Tubercularia*. When fresh the perithecia are swollen out and nearly spherical; but when old and dry the apical

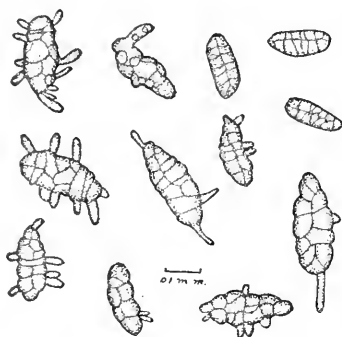


14. Longitudinal section of a single perithecium of *Pleonectria*.

portion around the minute opening collapses, so that a distinct and characteristic saucer-shaped depression is produced in each.

When the interior of the perithecium is examined a condition represented in Figure 14 is found. Around the outside is a wall or shell of sterile tissue, formed by the coalescence of hyphal threads. Projecting from the bottom of this wall, and converging toward the apex, are numerous cylindrical or club-shaped sacks, the *asci*, each containing eight elliptical, colorless spores. Each spore is divided by from five to seven cross-walls into sections, many of which are further divided by walls running across the first, as represented in Figure 15. The spores measure $16-22 \times 7-8 \mu$. The remaining interior part of the perithecium is filled with sterile tissue.

The spores are capable of germinating under favorable conditions and reproducing the species. Numerous cultures of the ascospores were made



15. *Germinating spores of Pleonectria.*

during the fall of 1895. Growth takes place freely in both acid and neutral potato-agar. A typical culture was started December 6th. At three in the afternoon, a dilution of three plates was made in acidified potato-agar, and kept in a room where the temperature was $70-80^{\circ}$ F. On Dec. 7th, after twenty-one hours, germination had begun.

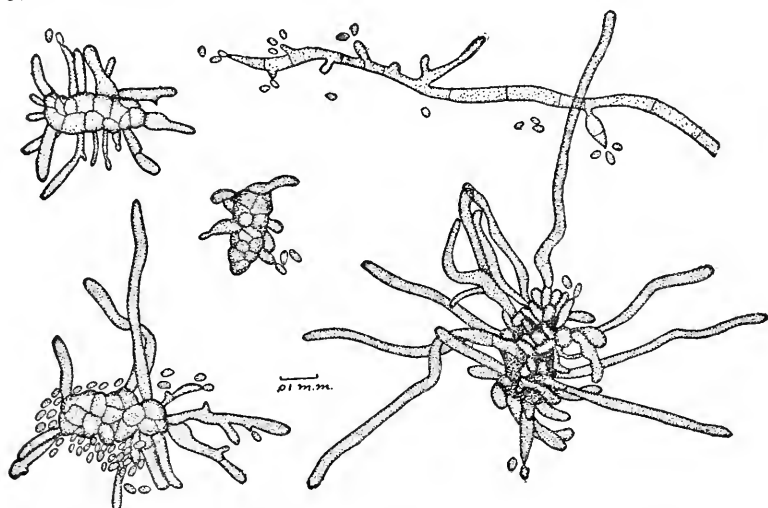
The spore first swells to several times its former size through the absorption of moisture. Small protrusions then appear at various points, which elongate more or less as germ-tubes (Fig. 15). In many cases the threads, after elongating a little, begin to throw off conidia by constriction

from their apices (Fig. 16). Such threads grow no further, but continue to cast off conidia in numbers. The conidia are oval in form, $4-6 \mu$ long, and closely resemble those of *Tubercularia*, except that they are a little smaller. The other germ-tubes elongate much by apical growth, and become much branched, forming a compact mycelium. Branching begins quite early, but septa do not become numerous until the thread has attained a considerable length. No definite relation could be seen between the number of germ-tubes and the number of cells of the spore. It occasionally happened that two or three tubes came from one cell, while some cells put out none.

After the mycelium was three days old, conidia in great numbers were cast off from the sides of the threads, much as in the case of the *Tubercularia* (Fig. 16). Short lateral branches are put out, which become constricted when as long as the diameter of the thread, and the apical portion is thrown off as an elliptical conidium. This process may be continued indefinitely by the same branch. The form of the lateral branches varies, some being long and tapering, while others are short and conical.

Innoculations were made from the plate cultures to sterilized bean stems by

touching a flamed needle into a colony containing many conidia, and touching again to the stems. The only resulting growth, at first, was a thin, sparse mycelium, which was scarcely noticeable. No white cushions were produced. After about two weeks growth, in two of the cultures, minute red points appeared. When these had increased to the size of a pin-head minute red protrusions were pushed out from the summits of several of them. When examined under the microscope, each red point was found to be a stroma composed of compact hyphae, but bearing no conidia. The protrusions presented every appearance of being forming perithecia. Unfortunately, the cultures were spoiled at this time, so that the resulting growth could not be traced.



16. Mycelium of *Pleonectria* producing secondary conidia.

Mycelium of *Pleonectria* was also inoculated to bean stems on which cultures of *Tubercularia* were growing, but the growth seemed to be in no way modified thereby.

Innoculations.

On May 4th, 1896, a series of inoculations of *Nectria*, *Pleonectria* and *Tubercularia* was made on currant cuttings. These were kept for a time in a forcing room in the conservatories, but were soon placed out-of-doors, after several of the plants had been attacked and killed by another fungus (*Botrytis*). About June 25th, several small, pink *Tubercularia*-like bodies appeared on two of the dead stems. These bore no conidia. Nothing has yet been produced on the living plants, nor, in the light of Mayr's experiments noted on a previous page, could results be expected in so short a time.

On the fifth of June, fresh conidia from Chautauqua county were innoculated on living currant bushes in the Horticultural grounds. An incision was made through the bark into the wood of young shoots, and portions of tubercles bearing conidia inserted. No results have yet been obtained from this experiment.

III. REMEDIES.

We have seen that the mycelium of the fungus, after having once gained entrance to the plant, lives from year to year in the tissues of the host; that it may remain there a long time without producing any external indications of its presence; and that in this way it may be transmitted through cuttings. The first suggestion, therefore, is that all cuttings be taken from plants known to be free from the disease. It is not safe to take cuttings from apparently healthy plants in a diseased patch, but they should be obtained from localities where the disease is not present. This is the more important, since the conidia (or summer spores) exist in the soil and on the bushes, so that cuttings are liable to infection through their cut surfaces, as Mayr has pointed out. The trouble being a deeply seated one, and the conidia liable to dispersion at various seasons of the year, spraying is not to be recommended. The conidia probably do not affect entrance to the plant through healthy parts, but through cut or injured surfaces. These should, therefore, be avoided as much as possible. The only positive remedy that can be suggested is the removal of the whole plant as soon as the disease begins to be manifested in the yellow foliage and prematurely colored fruits. The diseased plants should be burned, as the spores and conidia may be produced in abundance on dead plants and the trouble communicated to living bushes.

E. J. DURAND.

Bulletin 126.

February, 1897.

Cornell University Agricultural Experiment Station.

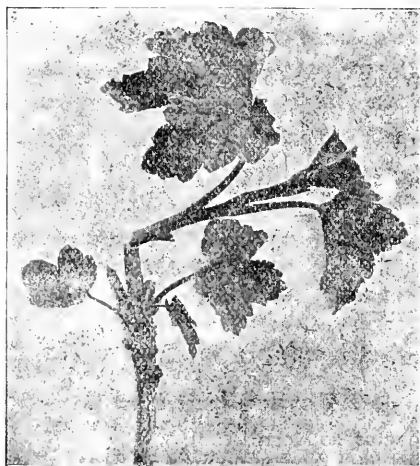
ITHACA, N. Y.

ENTOMOLOGICAL DIVISION.

The Currant-Stem Girdler

—AND—

The Raspberry-Cane Maggot.



By M. V. SLINGERLAND.

PUBLISHED BY THE UNIVERSITY,

ITHACA, N. Y.

1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.

THE CURRANT-STEM GIRDLER.

Janus integer, Norton.*

Order HYMENOPTERA ; super-family TENTHREDINA.

The indications are that currant growers will soon have another serious enemy to combat. Most growers are already familiar with the operations of the "green worms," and many have had their bushes badly damaged by one or both of the two common currant borers, known as the imported borer and the American borer. Within the past few years, however, an insect which is both a girdler and a borer, has been attracting considerable attention by its destructive work in quite widely separated portions of the country. Unfortunately the ravages of the insect seem to be increasing each year, but fortunately a study of its habits has shown that it can be easily and quickly checked. Every currant

*SYNONYMY.

Cephus filicornus. Harris' MS. catalogue. A manuscript name given by Say for a male specimen taken at Milton, Mass., in September, 1830.

Cephus integer. Harris' MS. catalogue. A manuscript name given by Say for a female specimen taken on a window at Cambridge, Mass., June 20, 1832.

1861. *Cephus integer* Norton. Proc. Bost. Soc. Nat. Hist., VIII, 224. First description of the insect, from Harris' specimens.

1862. *Janus flaviventris* Fitch. Seventh Rept. on N. Y. Insects, p. 852. Description of adult.

The willow-shoot saw-fly discussed by Dr. Riley as *Phyllæcus integer* Norton is doubtless another insect, *Janus abbreviatus* Say, according to Mr. Harrington (Canadian Uroceridæ, in Trans. Roy. Soc. Canada for 1893, p. 133). Dr. Riley admits that there were some differences between his specimens and Norton's description of *J. integer*.

The reference of Fitch's *J. flaviventris* as a synonym of Norton's *J. integer* was made after a careful examination and comparison (by Mr. A. D. MacGillivray) of the former's description and our bred specimens with Norton's descriptions and the original type specimen from the Harris collection. According to Know's latest generic table, the insect belongs to the genus *Janus*.

grower should therefore at once familiarize himself with the workings of this new pest, and thus be prepared to check it whenever any indications of its presence appear on his bushes.

Through the kindness of Mr. B. M. Hoag, South Easton, N. Y., in furnishing us an abundance of material, we have been enabled to breed the insect in our cages here at the insectary during the past year. Several new facts have resulted from this study of the pest; for instance, we had the pleasure of being the first to see the insect perform the interesting operation of girdling a currant shoot. (See plate IV, figure *a*.)

HISTORICAL.

This new currant pest is an American insect. As early as 1830, Dr. Harris captured a male specimen at Milton, Mass., and in 1832 he took a female on a window at Cambridge, Mass. Both these specimens were given different manuscript names by Say, but they were not described. Nearly thirty years passed before the insect again received any attention. In 1861 Norton wrote a description of it, evidently from Harris' specimens; he used one of Say's names for it, and stated that it also occurred in New York state. In 1862, Dr. Fitch described the same insect under a new name; he had captured it in May in New York state, and thought it might possibly be the insect that was boring in the rye stems.

The insect does not seem to have been mentioned in print again for a quarter of a century, or until 1888. But some of Professor Comstock's old unpublished notes show that Mr. J. F. Rose, South Byron, N. Y., had observed the work of a "new borer" in his currants in 1882. In February and April, 1883, he sent specimens of the injured shoots to Professor Comstock who succeeded in breeding the adult insect, which he determined at the time as being doubtless the insect described by Dr. Fitch in 1862. Thus these observations were the first to throw any light upon the habits of the insect, but as they were never published, it was not until 1888 that anything was recorded about any insect girdling currant shoots; and it was not until 1891 that it was publicly

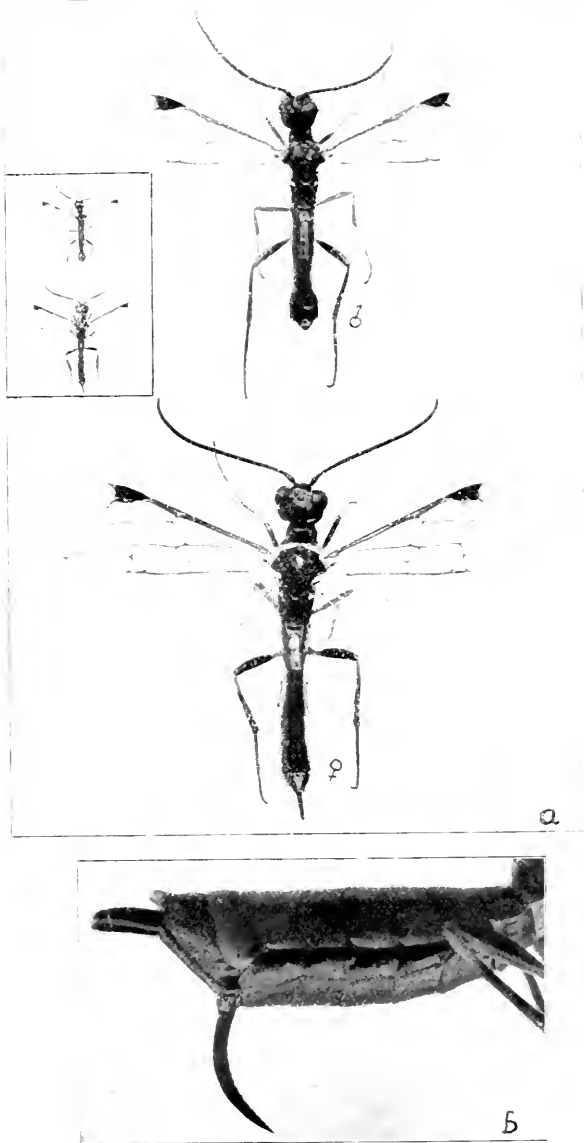


PLATE III.—a, male and female of the currant-stem girdler (*Janus integer* Norton), much enlarged; the same are represented natural size on the left of this figure. b, abdomen of the female saw-fly with its saw-like ovipositor in position for ovipositing or girdling. Much enlarged.

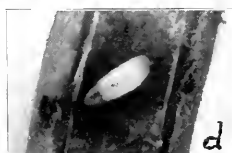


PLATE IV.—a, the female at work girdling a currant stem, natural size; b, girdled portion of a stem, much enlarged, to show the character of the girdle; c, girdled portion of a stem a few days after the girdling was done, much enlarged, to show the egg-scar; d, currant stem cut open to show the egg of the insect, much enlarged.

known that the author of this girdling was the insect described by Dr. Fitch in 1862.*

In 1886, the work of the insect was seen on currants at Adrian, Mich. In 1887, Dr. Lintner obtained specimens of injured tips from several gardens in the vicinity of Albany, N. Y., and some were sent to him from Macedon, Wayne Co., N. Y.; it was also known to occur in Canada as early as 1887. In 1891, girdled tips were found at South Byron and Chatham, N. Y. Professor Claypole recorded in 1892 that he had observed the work of the insect for several years at Akron, O. It attracted attention at Centreville, R. I., in 1892, and in 1894 the insect was quite numerous there, and also in different parts of Massachusetts. Our notes show that in 1895 considerable damage was done by the insect at South Easton, N. Y.; specimens were also sent to Dr. Lintner from Corning, N. Y.

ITS DISTRIBUTION AND DESTRUCTIVENESS.

The above historical notes show that this currant stem-girdler was first found in Massachusetts and has since been recorded in Rhode Island, New York, Canada, Ohio and Michigan. It is quite widely distributed over New York state.

As will be shown in our discussion of the life-history of the pest, it is capable of doing much damage to currant bushes. Thus far, however, its ravages have been confined to limited localities. We have no definite data in regard to the extent of its ravages. It has attacked the Cherry and Fay's Prolific currant, and the black currant. Doubtless the insect has no choice of varieties. It probably breeds freely on the wild currants from which it has recently turned its attention to the cultivated varieties.

INDICATIONS OF THE PRESENCE OF THE INSECT.

Observant currant growers will have no trouble in determining

* In 1887, many currant tips were girdled in the vicinity of Albany, N. Y., and in 1888, Dr. Lintner published an account of the work of this then unknown insect. In December, 1890, Mr. Allis, Adrian, Mich., wrote to Dr. Riley that he had bred in 1887 one pair of the insects which had been girdling his currant tips as described by Dr. Lintner; in 1889 he raised another adult which was sent to Dr. Riley to name. Dr. Riley replied that the insect was without doubt Fitch's *Janus flaviventris*.

whether this stem girdler is at work on their bushes or not. The results are very conspicuous from the first, as is well shown (half natural size) in the frontispiece. In May, after the new shoots have reached a growth of several inches, two or three inches of the tips of those attacked by the insect will suddenly wilt or fall over and hang suspended or may fall to the ground. A careful examination of the shoot at the point where it broke off will show that it was deftly girdled with several sharp, somewhat curved cuts extending nearly through the stem. Figures *a*, *b*, and *c*,



17.—Currant stems as they appear in winter, after having been girdled by the insect in May. One-half natural size.

plate IV. illustrate this girdling process which will be discussed in detail when we tell the life-story of the insect. Sometimes where the stem is quite large or the cuts do not extend deep enough, the tip will remain upright for several days or more, but it usually wilts, dies, and breaks off later. This girdling, of course, stops all further growth of the shoot at the tip, thus disfiguring and stunting that portion of the bush for the rest of the season. This severing of the terminal shoot, is, in fact, the principal damage done by the insect. Sometimes the growth of a very thrifty shoot will be continued by one of the side buds below the girdle, as shown (half natural size) on the right of figure 17.

The injured shoots can also be quite readily discovered in the winter; the three shoots shown in the left of figure 17 were cut before growth began in the spring. They show that the girdling in the preceding May had effectually stopped all growth during the season. The characteristic dead stubs on the ends of injured shoot render them sufficiently conspicuous to be recognized by

observant currant growers in the winter. Thus one phase of the work of this insect—its girdling habit—fortunately makes it a comparatively easy matter to ascertain whether it is present in a currant plantation or not, either during the growing season or in the winter.

THE INSECT'S APPEARANCE.

Although the insect makes its presence known in the conspicuous manner shown in the frontispiece, it is so shy that no one has ever caught the girdler at its destructive work on the bushes in the field. Thus currant growers will rarely, if ever, meet with the adult insect—the saw-fly—which does the girdling. However, many will be interested to know how the ingenious girdler looks. Both sexes are therefore shown, natural size, at the right of the much enlarged figures of the same at *a*, plate III. The insect is one of the saw-flies and is thus closely allied to the parents of the well-known “green-worms,” which every currant grower has to fight almost annually. They are called saw-flies from the fact that they have a saw-like ovipositor; it is quite a formidable affair in the case of the currant stem-girdler, as figure *b*, plate III shows. The uses to which this insect puts this saw-like instrument are discussed further on.

As the figures show, the male insect is somewhat smaller than the female, and it also differs somewhat in its coloring; both are pretty little saw-flies with shining black bodies and light brownish-yellow legs. In the male, nearly all of the abdomen is of a brownish-yellow color, while in the female the first half of the abdomen is of a reddish-orange color and the rest is black. The mouth-parts, in both sexes, are of a light lemon-yellow color, and similarly colored markings occur on the thorax around the bases of the wings.* The adults fly in May, and perhaps some currant growers may be fortunate enough to see some of the shy little creatures. The other stages of the insect—its egg, the grub, and the pupa—are to be found only in the currant shoot below where it was girdled. To see them one must split open the injured shoots at certain times during the summer. These earlier stages of the

*For detailed specific descriptions of both sexes see *Insect Life*, VI, 300.

insect and the proper time to look for them are discussed under its life-history.

THE STORY OF ITS LIFE AND HABITS.

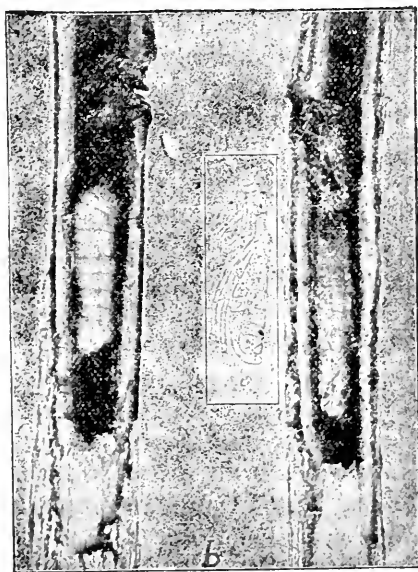
Its winter home.—At any time during the winter this stem girdler may be found within the shoots whose tips were cut off in the preceeding May ; three such shoots are shown, half natural size, on the left in figure 17. If such shoots be cut off and split open the condition shown at *a*, figure 18 will be revealed. Beginning at the tip, a tunnel will be found extending down the shoot for from four to six inches ; this tunnel is always packed full of brownish excrement, as shown in the figure. Nearly three-fourths of an inch at the lower end of this tunnel will be found nicely cleaned out and lined with a thin silken cocoon. Within this cocoon inside of the injured shoots the grub or larval stage of the insect passes the winter. In the right-hand shoot at *a*, figure 18 is shown the cocoon at the lower end of the tunnel ; it has been cut away in the left-hand shoot and the grub is thus revealed. At *b*, in figure 18 the lower portion of *a* is shown about two and a half times natural size. The grub or borer is of a glistening straw-yellow color, with the head slightly darker. The thoracic segments are nearly twice as wide as the head and are slightly wider than the others ; they bear six rudimentary feet. From the caudal end of the body there projects upward a peculiar dark brown horny spine, slightly bifid at the tip.*

Its spring transformation.—The grub remains in its silken cell unchanged all winter, but when spring opens in April it changes to the curious whitish pupa shown about twice natural size between the two shoots at *b*, figure 18. In 1896, the change from a grub to a pupa took place about April 15th, and about two weeks of the insect's life was passed in the pupal condition. In our cages, the pupae began to give forth the adult insect on May 2d, and all had emerged by May 6th. As the spring of 1896 opened unusually early, the adult insects emerged earlier than

* A detailed description of the larva occurs in Bull. 28 of the Mass. (Hatch) Expt. Station ; and an excellent figure of it may be found in *Insect Life*, VIII, p. 389.

has been recorded in previous records; from the middle to the last of May seems to be their normal period of emergence.

Egg-laying.—As no one had recorded any observations upon the habits of the adult insects, we were much interested to know how the female laid her egg, and why and how she girdled the currant shoots. Therefore, when a male and female emerged in one of our cages on May 2d, a special effort was made to cater to every whim they might manifest. Their "native heath" was imitated, so far as possible, by placing several freshly-cut currant shoots in a roomy cage. The pair of saw-flies were then carefully transferred to this cage. As though apparently appreciating the



18.—a, two currant stems cut open to show the tunnels made by the larva. The cocoon is shown in the lower end of the tunnel in the right-hand stem, and it has been removed in the other stem to show the larva. Natural size. b, the cocoon and larva enlarged about two and a half times. The pupa is shown (enlarged) between the two stems.

effort that had been made for her comfort, the female began laying eggs within fifteen minutes after she entered the cage. Evidently the insect sometimes begins egg-laying very soon after it emerges, for the female just mentioned had not been out of the cocoon more than two hours; we did not see the pairing of the sexes, and it may not have taken place, for as we shall see later, the female will sometimes lay unfertilized eggs.

In laying an egg, the female takes a position on the shoot a few inches from its tip, with her head towards the tip, and quickly works her long, curved, saw-like ovipositor into the shoot. At figure *b*, plate III, this ovipositor is shown much enlarged and drawn out in position for egg-laying; when not in use it is drawn upward and rests nearly out of sight in a groove in the end of the abdomen. This ovipositor is pushed or sawed in its whole length, and the egg is then quickly forced along between the two blades of the ovipositor and is deposited in the pith of the shoot, as shown much enlarged at *d*, plate IV. The ovipositor is quickly withdrawn, and the whole operation of laying an egg is accomplished in about a minute.

The egg is of an elongate-oval shape, of a yellowish-white color when first laid, about a millimeter (1-25 of an inch) in length, of a delicate structure, and without any characteristic sculpturing. In a day or two after deposition, transparent areas appear at both ends of the egg, and before hatching the whole egg loses its whitish opaque appearance and becomes transparent so that the developing grub can be plainly seen inside.

The slit cut by the ovipositor when an egg is laid is so small that it can scarcely be found even with a hand-lens until about two days after it is made. By that time nature, in her efforts to heal the wound has caused an increased growth around the slit, and there is thus a slight elevation on the shoot at that point. The egg-slit is readily seen on the lower part of the enlarged shoot shown at *c* on plate IV. Most of the eggs are doubtless laid in the latter half of May; some are not laid until June, as we received several on June 8th that had been laid only a few days.

How and why the shoot is girdled.—Immediately after the operation of laying an egg in the pith of the shoot is finished, the female walks up the shoot for from one-half an inch to an inch

and deliberately proceeds to girdle it. This is doubtless the most injurious of any of the insect's habits; and yet the manner in which the girdling was accomplished remained a mystery until we had the pleasure of seeing the female cut many shoots in our cages in May, 1896. Most writers have supposed that the girdling was done with the jaws of the insect, but our observations show that it is done entirely with the saw-like ovipositor.

A female is shown, natural size, in the act of girdling a currant shoot at *a*, plate IV. She first forces her ovipositor its whole length into the shoot. When she withdraws it, however, she does not pull it straight out, but twists it to one side so that it is held at right angles to the body, and then makes it saw its way out. As the ovipositor is curved, its tip first appears through the bark of the shoot off at one side from where it was forced in, and the rest of the "saw" soon comes through leaving a smooth, somewhat curved cut forming a part of the circle around the shoot equal in length to about the length of the ovipositor. The enlarged, recently cut shoot shown at *b*, plate IV, well illustrates the nature of these cuts. Without moving from her position, the female usually again inserts her ovipositor very near where she did the first time, but twists it the other way thus making two cuts extending in opposite directions from one point. She then moves around the shoot until she finds the end of one cut, and proceeds in the same manner to cut another slit. She continues this process of moving around the stem and cutting new slits from the ends of those just made, until the girdle of cuts is complete, or nearly so. We have repeatedly seen a female lay an egg in a minute and in the next four minutes girdle the shoot a short distance above the egg. Sometimes the girdling is so complete that the tip falls off at once, but usually a portion of the shoot remains uncut and the tip may remain attached for some time, especially if the shoot is a large and vigorous one. At *b*, plate IV, the ends of the girdle did not quite meet; and in some cases the female lost her bearings to such an extent as to continue the girdle of cuts in a spiral direction so that the last cut was above and nearly an eighth of an inch from the first one. Sometimes the female did not first make two cuts from the same point, but at once moved around the stem and made the second cut at

the end of the first, and so on around. Usually four or five cuts were sufficient to girdle a shoot.

It was very interesting to watch so deft and quick a worker as this insect when she was girdling a shoot. She was not easily disturbed when once her work was begun. We have seen one female girdle four or five shoots in an hour in our cages. Of course, the number of tips one insect will girdle, depends upon how many eggs it lays. One female in our cages girdled fourteen shoots and was then accidentally drowned. A careful examination revealed four more eggs in shoots that she had not girdled, and we found ten eggs in her abdomen; thus one female is capable of laying at least thirty eggs or may girdle thirty currant shoots. Much damage might thus be done by only a comparatively few of the insects in a currant plantation.

Doubtless the object of the girdling of the shoot above the egg is to cause a cessation of the growth, and thus prevent any injury which might come to the delicate egg or young grub from the vigorous growth which currant tips make in the spring. Yet in spite of this precautionary habit of the mother, many of her young never develop, as we shall see.

Habits of the borers.—Some of the eggs laid by the insect in our cages hatched out the grubs in about eleven days. The minute borers at once began feeding upon the pith of the stem, and tunneled their way downward in the pith, as shown in the left-hand shoot in figure 19. They seem to feed almost entirely upon the pithy part of the shoot; often enough of the woody portion remains to sustain sufficient life in the shoot to develop buds all along the sides of the tunneled portion, as shown in figures 18 and 19. The excrement voided by the borers remains in their tunnels, filling them full of a dark brownish mass, as illustrated in the same figures. If an injured shoot be split open at any time between June 1st and September 1st, the borers may be found at work within their tunnels.

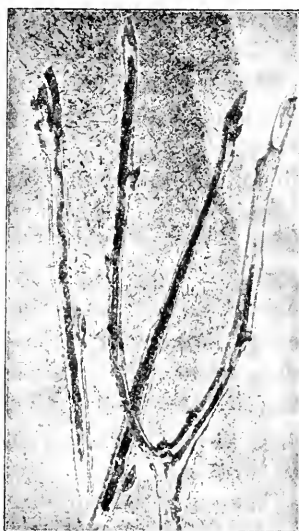
The great mortality among the eggs and young grubs.—Our observations agree with those recorded by Mr. Marlatt (Insect Life VII., 338) in regard to the failure of many of the eggs and young borers to develop. The material sent us in the spring of 1896, indicated that not over 15 per cent of the eggs laid the preceeding

year had developed full grown borers; in most cases the eggs apparently did not hatch, as no tunnel had been begun in the pith, but in some cases the borers got nearly half grown before they succumbed. As Mr. Marlatt stated, the reason for this great mortality is not apparent. He suggested that it might be due to the fact that the cultivated currant, on account of its difference in growth or greater luxuriance, is not as suitable to the insect as wild currants or allied plants, which were presumably its original food plants.

Another explanation of this great mortality may be the fact that an unfertilized female will lay eggs and girdle the shoots as freely as any other female. We demonstrated this fact in our cages last year, but we were not able to definitely determine whether these unfertilized eggs hatched or not.

However, the fact that there is such a great mortality among the eggs and young grubs of this insect, is of but little practical importance to the currant grower, for in the girdling of the shoots, the pest does its principal injury.

Extent of the tunnels of the borer, and its preparations for the winter.—The grubs begin their work of tunneling down the pith of the girdled shoot as soon as they hatch in the latter part of May. Although the borer continues to work in the pith for about three months, its tunnel rarely extends more than six inches from the point where the shoot was girdled. In one instance where three shoots branched off, as shown in figure 19, a borer tunneled down to the base of one shoot and then across the main stem and part way up another shoot, where it met its death from the attacks of one of its enemies.



19.—Currant shoots split open to show the character of the tunnels made by the borers. One-half natural size.

About September 1st, the borer begins to make preparations for the winter and for its further transformations. It cleans out the

lower end of its burrow for the distance of about three-fourths of an inch, and also eats a passage way through the woody portion of the stem out to the outer layer of bark which soon dies and sinks in slightly at this point. This passage way is partly filled with excrement or "frass," and the grub then proceeds to spin a thin silken cocoon about itself within which it remains as a grub all winter. These winter preparations are well illustrated at *b*, in figure 18. Sometimes the small dead sunken area of bark covering the passage to the cocoon may be readily detected in winter or spring on an injured shoot. This passage-way enables the adult insect (the saw-fly), to easily make its way out from the cocoon in May.

NATURAL ENEMIES.

The eggs embedded in the pith of the shoots, and the borers as they tunnel their way down the pith, seem to be beyond the reach of their enemies. But the necessity of eating a passage-way to the outer bark to provide for the emergence of the adult insect affords an opportunity which their little foes seem on the alert to secure. Nearly one-third of the full grown borers sent us in the spring of 1896, had been attacked and killed by tiny hymenopterous parasites, evidently after they had spun their cocoons. In every case the little foes had doubtless broken through the thin door opening into the passage-way leading to the cocoon, and had inserted their eggs into the body of their helpless victims. These eggs hatched out maggots which lived at the expense of the body of their host. When full grown the little maggots spun their silken cocoons within the larger cocoon made by the borer. In one case five of the tiny Braconid parasites (*Bracon apicatus* Prov.) emerged from one cocoon of the currant stem-girdler. Curiously enough the parasite nearest the passage-way emerged first, and the others followed in regular succession; we saw one emerge, and upon examining the cocoon next behind, found the adult parasite all ready to appear, while in the next cocoon, we found the insect still in the pupa state. It is to be hoped that this little enemy will continue its good work among the grubs of this new currant pest.

HOW TO CONTROL THE INSECT.

The currant-stem girdler can not be reached at any time or in any stage with a spray. Fortunately, however, its habits are

such that it can be easily controlled by other means. The girdling habit of the adult insect (see the frontispiece), which causes the tips of the young shoots to wilt, die, and drop off in May, makes it easy for currant growers to determine whether the pest is present in their fields, and also just where to apply the remedy. As the egg is embedded in the shoot less than an inch below where the girdling is done, and as the grubs rarely tunnel down the pith to a depth of more than six inches, if the injured shoots be cut off at least eight inches below their tip and burned, all traces of the insect will be effectually destroyed. Only two or three inches of the tips need be cut off, if it is done in May or June, soon after the girdling is done. The cutting and burning of about eight inches of the tips of the injured shoots at any time of the year, even in winter, will prove a practical and effective remedy for this new pest.

BIBLIOGRAPHY.

- 1861. Norton. Proc. Boston Soc. Nat. Hist., VIII., 224. Original description of the insect.
- 1862. Fitch. Seventh Rept. on N. Y. Insects, p. 852. Description of adult.
- 1869. Norton. Trans. Am. Ent. Soc., II., 346. Description of adult.
- 1887. Cresson. Cat. of Hym. p. 172.
- 1888. Lintner. Fourth Rept. on N. Y. Insects, pp. 17, 47, 189. First account of the work of the insect.
- 1890. Lintner. Sixth Rept., p. 190. Specimens received.
- 1891. Riley. Insect Life, III., 407. Identification of the currant-stem girdler.
- 1892. Claypole. Can. Ent. XXIV., 273. Notes on the insect in Ohio.
- 1893. Lintner. Eighth Rept., p. 166-168. Review of what was then known of the insect; Ninth Rept., p. 461. Specimens received.
- 1894. Marlatt. Insect Life, VI., 296-301. Detailed, illustrated account of the insect.
- 1894. Lounsbury. Bull. 28, Mass. (Hatch) Expt. Station, p. 20. Illustrated descriptive account.
- 1895. Marlatt. Insect Life, VII., 387-390. Detailed, illustrated account of early stages and habits of the insect.
- 1897. Lintner. Eleventh Rept., p. 284. Specimens of the adult received May 11th, 1895, from Corning, N. Y.

THE RASPBERRY-CANE MAGGOT.

Pho bia sp.

Order DIPTERA ; family ANTHOMYIIDÆ.



20.—A raspberry shoot attacked by the raspberry-cane maggot. Natural size.

Recently a new insect pest has appeared in many raspberry plantations in New York state. It attacks the new shoots in the spring, and in one field sixty per cent of the new growth was killed by the insect in 1895. We first learned of its ravages in our state in May, 1895, when specimens were sent to the insectary from two localities in central New York, Spencer and Cortland. Raspberry plantations in the vicinity of Ithaca, N. Y., were at once examined with the result that in some cases one-third of the new shoots were being killed by the pest ; it was also nearly as destructive at Ithaca in 1896.

Raspberry growers should therefore at once familiarize themselves with the work of this new insect enemy, so as to be able to intelligently combat it whenever it may appear in their plantations.

INDICATIONS OF THE PRESENCE OF THE INSECT.

This raspberry-cane maggot attacks only the new shoots which appear in the spring. The results of its work are very conspicuous, and raspberry growers can thus easily determine if the insect is present in their fields. Three injured shoots are represented, natural size, in figures 20 and 21. These figures show that the tips of new shoots attacked by the insect wilt and droop; the stem of this tip shrinks, turns dark blue in color and finally dies. The wilted tip may be easily broken off at a certain point. If the shoot be carefully examined at this point it will be found to have been girdled by the insect from the inside; how this girdling is done will be described in telling the life-history of this pest. Sometimes a very vigorous shoot will continue its growth from side buds, thus forming a branched cane, but usually the injury to the tip results in the death of the whole shoot. In one case the terminal tip and the tips of three of its side shoots had all been killed by the insect.

The pest begins its destructive work as soon as the shoots appear above the ground in the latter part of April, and its work continues during the whole of May. All sizes of the new shoots are attacked; those in figures 20 and 21, and at *b*, plate V, are represented natural size.

Thus when raspberry growers find the tips of new shoots wilted and drooping in May, it is an indication that this new insect pest is at work in their fields.*

THE APPEARANCE OF THE INSECT.

Although raspberry growers will have no trouble in discovering the work of this pest, only the most careful observers will doubtless ever see the adult insect. So close is the resemblance, that the ordinary observer would say that the little flies, which may be seen on the new shoots in May, were simply house-flies. But a careful study of one of the flies, shown much enlarged at *a*

*The raspberry-cane borer (*Oberia bimaculata*), causes the tips of the growing canes to wilt and droop in a similar manner, but this insect does not begin work until considerably later, in June. Thus the work of the two insects need not be confounded in our state.

plate V, would reveal many differences. A detailed description of this fly is unnecessary here. It is a grayish-black, two-winged fly, not quite so large as, but closely resembling the well-known house-fly, of which it is a near relative.

The progeny which hatch from the eggs of flies are known as maggots. To see the young, or the maggots, of this raspberry pest, it will be necessary to carefully split open an injured shoot ; in June the maggot will usually be found below the girdle in the lower portion of the shoot. The maggot is slender, white, smooth, footless, and measures from 8 to 10 mm. in length when full-grown. Its black hook-like mouth parts may be indistinctly seen through the semi-transparent skin of the head. Its blunt caudal end has around its margin several small fleshy pointed tubercles, and from the centre project the two elevated brown spiracles.

ITS NAME.

This new raspberry pest belongs to that peculiar order of insects—the true flies—known as the *Diptera*. It is one of the Anthomyiids, and is thus closely related to the cabbage and the onion root-maggots discussed in bulletin 78. In 1886, Mr. Fletcher bred the adult insect, but did not have an expert determine its name. Others who have noticed its work have failed to get the fly. We also failed in our first attempt to breed the insect in our cages, but finally succeeded in obtaining several flies from material collected in the field early in the spring. As the females of many of these Anthomyiid flies are so near alike, it is necessary to study the males to get specific characters for determination. We sent two males to a specialist in England, Mr. R. H. Meade, but they arrived in such a mouldy condition that it was impossible to determine their name, except that they doubtless belonged to the genus *Phorbia* ; this is the same genus to which the cabbage and the onion maggots belong.*

*Mr. Meade wrote us : " The two Anthomyiids which you sent me belong to the genus *Phorbia* ; but do not seem to be identical with any European species that I know of. They are so covered with mould, however, that most of their characteristic features are destroyed."

Thus this new raspberry pest may also prove to be new to science and therefore as yet unnamed.

HISTORICAL.

The first record we find of any maggot working in raspberry shoots is the statement of Professor Cook that he found "a maggot working in the succulent growth of a raspberry cane" in 1886, at the Agricultural College in Michigan; this was doubtless the same insect as the raspberry-cane maggot under discussion. The next year, what was probably the same insect, was observed at work in Canada, by Mr. Fletcher; he recorded a very brief but accurate account of its habits. In 1890-'91, a raspberry-cane maggot was seen in some West Virginia plantations. In 1894, apparently the same pest destroyed nearly half the new shoots in a raspberry field at Lansing, Mich.; and was also reported as doing considerable damage in the vicinity of Costello, Pa. During the past two years it has injured a large percentage of the new shoots in the raspberry plantations of central New York; in 1895, Dr. Lintner received many infested tips from Adams, Jefferson Co., N. Y.

DISTRIBUTION AND FOOD-PLANTS.

From the above historical review, we learn that this new raspberry pest seems to have thus far attracted attention only in Michigan, New York, Pennsylvania and Canada. All observers report that it is apparently as yet confined to limited localities. Its spread will doubtless be rather slow; the flies may go from one field to another, and a few of the maggots or puparia may be transported in stock shipped from infested fields. Although we have seen its work only in Tompkins, Cortland and Tioga counties in our State, yet we are quite sure, from conversations with raspberry growers, that it occurs in many other localities.

The insect works in the new shoots of both red and black raspberries, and no other food-plants have been recorded.

THE LIFE-HISTORY OF THE INSECT.

In the latter part of April, when the new raspberry shoots are a few inches in height, the adult insect—the fly shown much enlarged at *a*, plate V—appears and soon begins laying eggs.

Egg-laying.—The comparatively large, prettily sculptured, elongate, white eggs of this pest are loosely placed near

the very tip of the shoot in the crotch formed by the bases of the tip leaves; at *c*, plate V, is shown one of the eggs much enlarged, and at *d*, are represented three eggs, natural size, in the position in which they were laid. As the fly is smaller than a house-fly, these eggs are comparatively large ones for such an insect, and would thus indicate that one female fly does not lay a large number of eggs. How soon the eggs hatch, we did not determine; it is doubtless but a few days.

Work of the maggot.—The little white maggot which emerges from the egg, crawls down the shoot for a short distance (less than an inch), and then burrows its way into the pith of the shoot. The entrance hole of the maggot is usually quite conspicuous, as the surrounding tissues turn blackish. After the maggot reaches the pith it proceeds to tunnel its way downward, making a small, somewhat tortuous tunnel in the pith. After tunneling about half the length of the shoot (sometimes this is six inches or more but may be only an inch or two), the maggot works its way nearly out to the bark, and deftly continues its tunnel around the shoot, thus girdling it from the inside; this interior girdle or tunnel shows well in the broken shoots at *b*, plate V. Usually the maggot eats a small hole out through the bark, at some point in the girdle; the use of this opening, we have not determined. The maggot continues feeding on the pith at the point where the girdling was done, and nearly severs the shoot in this way. The shoot in the lower right-hand corner of *b*, plate V, is represented with the bark removed to give a clearer idea of this interior girdling. Usually the maggot girdles the shoot in a spiral manner, sometimes tunneling nearly twice around, as shown on one shoot in the right-hand corner of *b*, plate V.

The part of the shoot above the girdle soon wilts, shrinks in size and droops over as is shown in figures 20 and 21. Soon after the tip droops, a dry rot begins at the girdled point, the wilted portion turns a dark blue color, and the whole shoot usually dries up and dies. Perhaps the maggot could not develop in a growing shoot, and it would also be hindered in its transformation to the adult in such a shoot. This may be the explanation why the insect girdles the shoot.

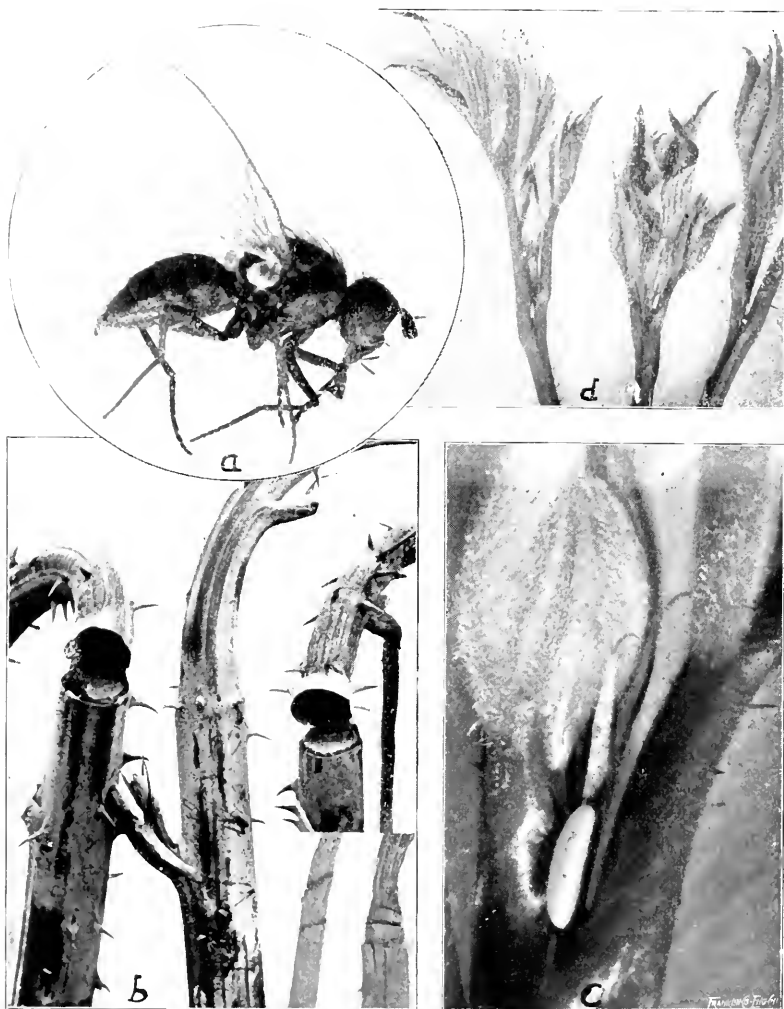


PLATE V.—The raspberry-cane maggot (*Phorbia* sp.). a, adult female fly, much enlarged; b, raspberry shoots girdled by the maggot, natural size; c, egg, much enlarged; d, tips of three shoots, each bearing an egg in its natural position in the crotch at the bases of the leaves, natural size.

After thus checking the growth in May, the maggot proceeds to burrow its way downward in the pith and finally reaches the base of the shoot at or near the surface of the ground. This point is usually reached sometime in June.

Pupation.—By July 1st, many of the maggots had undergone a transformation in the lower end of their burrow. Their skin had hardened, turned dark brown in color, and inside this *puparium*, the insect was passing through the *pupa* stage, preparatory to becoming an adult.

Although the puparium is found in June and July, the adult insect—the fly—does not emerge until the next April. The winter is thus passed as a pupa inside the dead base of the shoot. There is but one brood of the maggots each year.

NATURAL ENEMIES.

Like most of our injurious insects, this raspberry-cane maggot has its enemies among its own kind—the insects. Instead of the adult insect—the Anthomyiid fly—emerging from some of our puparia, a little four-winged hymenopterous parasite appeared. The indications are that many of the maggots fell a prey to this little enemy in 1895 and 1896. It has been determined as *Idiasta incompleta* Prov. We hope its good work may continue in our raspberry fields.



21.—Infested raspberry shoots. Natural size.

HOW TO COMBAT IT.

With a little watchfulness this new raspberry pest may be easily checked. Its presence may be quickly detected in May, as its work is then very conspicuous; and this is the only month in

which the insect can be combated practicably and with any success. It is capable of doing much damage, especially on new and valuable varieties.

The remedy is simple. As soon as a drooping tip is seen, either pull up the shoot or cut it off several inches below the girdle and burn it. This method faithfully carried out throughout May, will quickly check the pest. There is no possible chance of getting at the insect with a spray. Simply burn all infested shoots in May.

BIBLIOGRAPHY.

1888. Cook. An. Rept. Mich. Bd. of Agriculture for 1887, p. 450. Records finding an Anthomyiid maggot in a raspberry cane in 1886.
1888. Fletcher. Report for 1887, p. 36. Brief, accurate account of a raspberry-cane maggot. *Anthomyia* sp.
1891. Fletcher. Bull. 11, Ottawa Expt. Farm, p. 24. Account of raspberry-cane maggot (*Anthomyia* sp.) with remedy.
1893. Webster. Bull. 45, Ohio Expt. Station, p. 189. Quotes Fletcher's account.
1894. Davis. Insect Life, VII, p. 199. Describes the work of a dipterous raspberry girdler in Michigan.
1894. Hopkins. Insect Life, VII, p. 201. Had observed the raspberry-cane maggot in West Virginia in 1890-91. An Anthomyiid?
1894. Slingerland. Bull. 78, Cornell Univ. Agr. Expt. Station, p. 485. Evidence that the raspberry-cane maggot is not identical with *Phorbia brassicae*.
1897. Lintner. Eleventh Rept. on Insects of N. Y., pp. 170, 285. Brief account of the work of the insect at Adams, Jefferson Co., N. Y. Review of previous accounts.

MARK VERNON SLINGERLAND.

Bulletin 127.

February, 1897.

Cornell University Agricultural Experiment Station,
ITHACA, N. Y.
HORTICULTURAL DIVISION.

A SECOND ACCOUNT OF
SWEET PEAS.



By A. P. WYMAN and M. G. KAINS.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

- 124. The Pistol-Case-Bearer in western New York.
- 125. A Disease of Currant Canes.
- 126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
- 127. A Second Account of Sweet Peas.

CORNELL UNIVERSITY, ITHACA, N. Y., Feb. 10, 1897.
Honorable Commissioner of Agriculture, Albany.

SIR :—The enclosed report is submitted for publication under the provisions of the Experiment Station Extension bill, and it is a complement to Bulletin 111, issued a year ago this month. This Bulletin 111 was the first experiment station report upon sweet peas. It called forth some harsh criticisms, which were very largely due, I think, to a misconception of the problem at which we were working. Our motives in its preparation were two : to popularize the sweet pea, and to give an account of the varieties which were actually sold by the dealers last year. Our estimates of varieties were often very unlike the estimates which are currently made of them ; and it was charged that many of our varieties must have been very untrue to type or else grown from very poor seed. If this charge was true, it only shows that poor seed was in the market and it is evidence enough that the test was needed. In other words, our effort was to determine the exact merits of the sweet peas commonly offered for sale, not to grow the strains of fanciers and plant-breeders. This fact was stated in the bulletin and the reader was cautioned that our estimates of the varieties were drawn solely from our local tests, as follows : “An attempt was made the past season to obtain all the sweet peas which were offered by American seedsmen. * * * The reader should remember, however, that these opinions are founded solely upon the behavior of the varieties upon our own grounds last year. They are not intended to serve as a general or infallible estimate of the varieties. The accounts of these varieties are all made directly from the plants as they grew on our grounds, uninfluenced by published descriptions.”

Having grown the sweet peas of the retail seedsmen last year, we have this year turned our attention to the types and strains of the experts and breeders. It is evident, therefore, that the descriptions of this year are not comparable with those of last year ; but the sweet pea lover may be interested to study the dissimilarities in the accounts of the two seasons made from seeds from different sources. In order that there should be as great uniformity as possible in our own work of the two seasons, we have grown the peas of this year upon the same ground which

we used last year (although it was in better condition), and Mr. Wyman has again taken notes. Mr. Hutchins, C. C. Morse & Co. and the Sunset Seed and Plant Co., supplied us most generously with seeds and have been most helpful with suggestions.

It may be well to repeat that these estimates of the varieties of sweet peas are those which have been formed solely from a most careful study in the experiment patch at Ithaca. We did not make the experiment as a mere variety test, and we do not care whether anyone accepts our estimates of varieties or not. We have tried to write the truth as we have been able to see it, hoping that the record may be a contribution to the history of the evolution of the sweet pea. The lists are capable of showing the student how far the flower has been developed, and what measure of satisfaction he may expect in the growing of it. Neither are we desirous of breeding new varieties. That is not our mission, and there are others who can do it much better. We have made a record of what the flower is and what may be expected of it; and now we must hurry on, for we have lots to do.

Our peas were sown April 20, upon a clay loam which is low enough to keep moist through the season. Until the plants began to bloom freely, the land was kept in a thorough state of tillage. Fig. 22 shows the plantation as it looked July 20, before the heaviest bloom had appeared. In this plantation, 176 separate samples of peas were grown. The study of these peas was put in the hands of two mature and capable students. Mr. Wyman did the greater part of the work upon the former test. During the present season he represented us at the sweet pea show at Springfield, Mass., whence we sent a collection of blooms representing the common run of the plantation. Mr. Kains is a post-graduate student in the College of Agriculture. The work of these young men has been carefully supervised, and I endorse the results, although, of course, it is impossible for any two persons to arrive at identical conclusions respecting the merits of given varieties.

We have no further information to give for the cultivation of sweet peas than was given in our former bulletin, except to say that the ground may easily be made too rich for them. Several persons complained to me last year that their sweet peas grew luxuriantly but did not bloom. They had used too freely of

stable manures, and the plants ran to vine. The sweet pea is one of that class of plants (the leguminous) which appropriates nitrogen for itself, and heavy applications of nitrogen are therefore not needed. Another type of complaints was to the effect that young plants died after having made a good growth of several inches. Inquiry revealed the fact that in every case the plants had been frequently watered from a watering pot. Just enough water had been applied to keep the surface of the ground soggy, and the plants had damped-off. Plant lovers should remember that one good watering which wets the ground clear down is worth a dozen dribblings. It is rare that a sweet pea bed should be watered oftener than once a week in good soil; and if the seeds are got in early, a frequent stirring of the surface soil with hoe or rake is better than watering at all.

In the forcing of sweet peas we have made two tests in a very small way. A year ago we sowed seeds in a bench in a chrysanthemum house on October 24, and they began to bloom Feb. 20, and continued to blossom well for six weeks. The bloom was not so profuse as it is out of doors, but the flowers were just as large and handsome and fragrant. Fig. 23 shows a corner of sweet peas as they looked early in March. We also had a most profuse bloom in a row forty feet long during last April, May and June. The seeds were sown in pots, and when chrysanthemums were taken off (from a solid bed) on December 10, the peas were turned into the soil from 2½-inch pots. They were blooming freely when sweet peas were quoted as high as carnations. Last fall we sowed seeds in the same house September 8 in a solid bed. The plants grew well, and a single truss opened on November 30. The weather then closed in for a characteristic Ithaca winter, and the sun did not shine again for a full day for two months, and no other flowers appeared until early in February. If the weather had remained bright, I see no reason why we should not have had good flowers for Christmas.

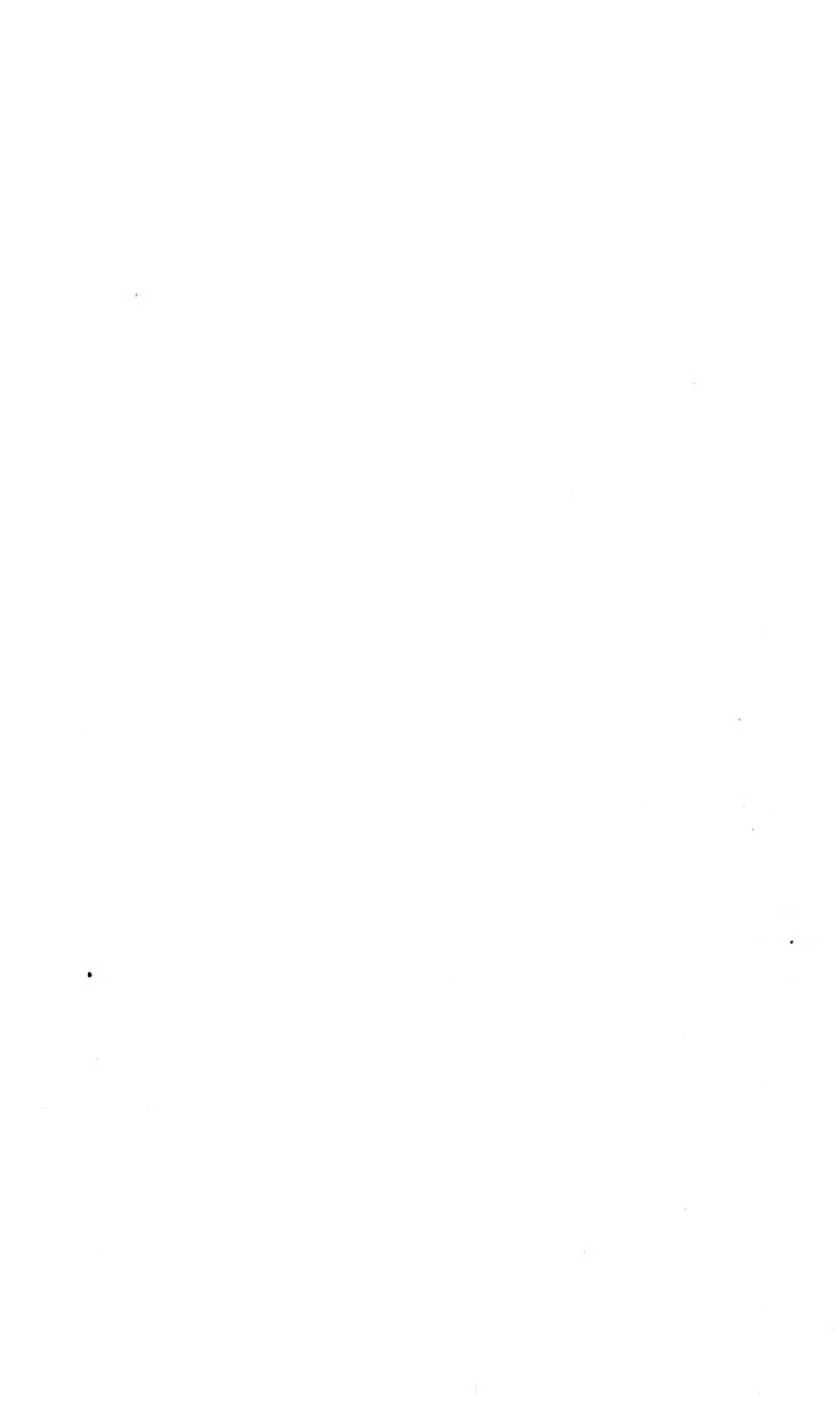
The history and something of the evolution of the sweet pea are traced in our Bulletin 111; but Rev. W. T. Hutchins, Indian Orchard, Mass., a long-time student of the flower, has given me his conception of the evolution of the modern varieties in a graphic form, which is here reproduced :

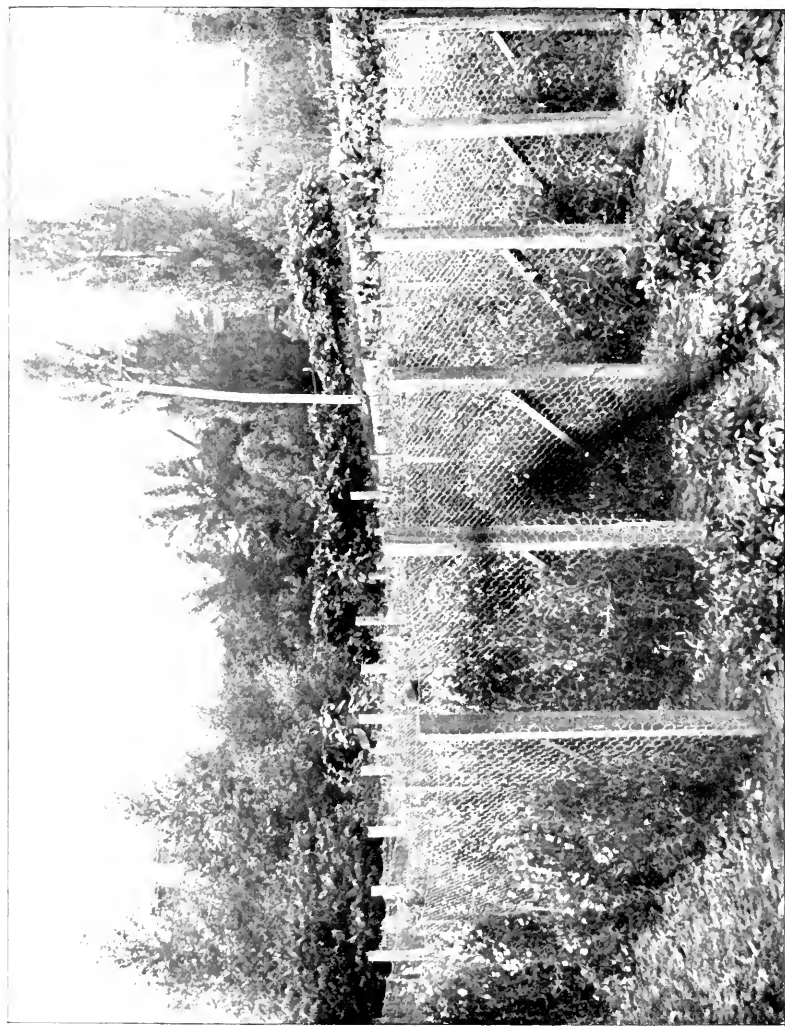
Ferry growth, and all varieties that have blue in them come a Light Blue and Purple. This is always the rule when crossing on Cupid. Here and there are plants of Cupids, but these come because the crossing was not made perfectly. It is very hard to cross on Cupid as the pollen breaks away when the bud is very small. Several years ago I put Cupid on Venus and last year I got a weak Blanche Ferry of ordinary Blanche Ferry growth. Last year I put Cupid onto this cross and now I have a Cupid again. This is three-fourth Cupid blood and one-fourth Venus, and still it does not show any of the latter. It cannot be distinguished from the thousands of Cupids we have growing.

“Of the other crosses, that is, those on the taller varieties, the results are also discouraging. There are several new things, however, that save the whole summer's work from being a total failure. My stock of Penzance on Venus '95 was put onto Coquette (a plant which I found last year and a variety which Eckford will introduce in this country next year) brought me a variety with a pale pink standard and white wings. It has the grandiflora form and is very pretty. Lottie Eckford on Eliza Eckford brought me a flower like the former, but color of reddish mauve. Last year I had an 'Improved Royal Robe.' It was a result of Penzance on Venus and was the finest stock on Royal Robe I ever had. This year it broke up into many new and several old varieties, but all of very fine form and color, such as buff, with a suggestion of pink, a rose edge, a pink edge on white ground (Eckford's Countess of Aberdeen), a pink edge on buff ground; there are fine shades of white, also improved Ovids, Royal Robes, Lady Penzance, Blushing Beauty, etc. It is truly the finest mixture in sweet peas; there is not a flower of poor form or color in it. We will also have for next year's introduction a pink which will correspond to Grey Friar. It is better than the latter, as the color is much finer.”

It is hoped that this bulletin may contribute something to the joy of rural life by interesting persons who have a rod of land to spare, in the delights of plants and the restfulness of nature-study.

L. H. BAILEY.





22.—The Cornell sweet pea patch, July 20, 1896.

A SECOND ACCOUNT OF SWEET PEAS.

I. NOTES UPON SWEET PEAS (*A. P. Wyman*).

Someone asked Mr. Burpee at the Springfield Sweet Pea Show what are the important points to be observed in judging the value of varieties of sweet peas. He replied by quoting from Eckford, but arranged his points in different order: "form, size, substance, and color." He, of course, looked at the matter from the seedsman's point of view. To him commercially, color was the least thing to be considered. The general observer would see color only, and experience only a vague satisfaction or dissatisfaction if the other points were not what they should be. But Mr. Burpee had good ground for putting color last, for this, tolerably sure to be good anyway, is absolutely worthless unless placed on a canvass suited to receive it.

The various forms which the sweet pea assumes easily fall into four classes. One class is the large flower which bends and curls its standard forward into a hood, like the Countess of Radnor. Another large flower, as Gaiety, spreads itself out into a broad, round, expanded form, but without a stiff effect. Still another bends or reflexes the sides of its banner backward in a manner not so pleasing, and if the substance is poor, in a manner which is almost ugly as in Fairy Queen. Last, there is the stiff, erect blossom, the smallest type, from which all the varieties have sprung, as Carmen Sylva. In connection with this expansion and hooded character and reflection, must be considered the shape of the base of the standard. In the last or old natural form, and to a greater or less extent in the reflexed, the base is wedge-shaped. In such case, the banner cannot help falling backward, because there is no structure to pull it forward into place. In the expanded and hooded forms, the base is different. Here it is not only straight horizontally or truncate, but in the hooded form is drawn down, giving an ear-like or auriculate shape. This explains the characters of the two expanded and hooded classes. The broad truncate base is stiff and pulls the edge of the blossom forward tightly into place, or if it is auriculate, it is still stronger, and curls the edge still farther forward into a hood. There are

two other variations which cannot be classified and which occur in the poorer forms only, as a rule. These are the occurrence of a notch at the top, or really the emphasis of a minute notch already there, as in *Emily Henderson*, or else a notch or sinus at either or both sides of the standard, as in the case of the *Butterfly*.

Three sizes are commonly accepted and will be found accompanying the classification above. The small, as in *Captain Clarke*, is that of the old natural form. The medium size is the one usually found in the reflexed form, like the *Boreatton*. While the large size of *Senator* and *Dorothy Tennant* is that of the expanded and hooded classes.

Substance, that is, the quality of texture which enables the flower to retain its shape, has arbitrarily been put under the heads of good, fair, and poor. Those varieties which keep their blossoms fresh and rigid in the heat of midday are called of good substance. Those whose blossoms curl and wrinkle badly are called poor, and the fair are various degrees between. The value of substance as affecting the beauty of the flower is not appreciated until one gives close study to the sweet pea. A flower without good substance or texture is absolutely ugly. Without strong substance it would appear that expansion and hooded character could not remain, and the flower would fall back into the reflexed class where, with its large size, it would curl and wrinkle until, in the lowest types, the flowers become worthless.

It is now possible to give the characteristics of the four classes into which most varieties of sweet peas seem to fall. This idea of classifying them was suggested by Mr. Hutchins, who based his classes upon the shape of the base, and the degree of substance or size which would result therefrom. A full statement of these classes, as they seem to work out from the studies of the Cornell tests, is as follows :*

I. The old natural form, with a wedge-shaped base, erect, expanded standard, and small size, as *Delight* and *Carmen Sylva*.

II. The reflexed form, with a more or less wedge-shaped base, the standard with its sides more or less curled backward or re-

* Another classification is given in the "Sweet Pea Review" of the Sunset Seed and Plant Co., San Francisco,—a booklet which is invaluable to anyone who desires full descriptions of varieties.

flexed, of medium size, and of substance rarely good, as Firefly, and Fairy Queen.

III. The expanded form, with a truncate or somewhat auriculate base, a broad, erect, rounded standard, large size, and fair to good substance, as Gaiety and Ovid.

IV. The hooded form, with an auriculate base, a hooded or half-hooded standard, large size, and fair to good substance, as Her Majesty and Emily Eckford.

These classes, of course, are not divided by hard and fast lines, but no variety in the experiment has yet been found which either did not fall or tend to fall into one of them.

We are now, perhaps, better prepared to understand Mr. Burpee's preference in putting color last in the scale of points. It is because form brings with it a number of other qualities, all of which make a flower a good one or a poor one. There is, however, a deeper reason for this preference for form which it would need an artist to explain. The eye is as much pleased with beauty of form as with color. The mere outline of a blaze of light carries with it a certain effect. Ruskin tells us that the old Gothic windows in the best days of Gothic architecture owed their characteristic beauty to the form of the aperture in which the stained glass was placed and not to the decorations about that aperture. It would seem to be the same with the sweet pea. Unless there is a full blaze of light from a full rounded curve, the effect in part is lost. Then, too, the variations in light and shade in the complexity of the flower are no small addition to the complete rounded effect. Last, the blossom must be large enough to be appreciated, but still not so large as to lose that delicacy which is one of its greatest charms.

The variety of color which is to be found in the sweet pea is wonderful. Since the four original varieties were sent out, numerous additions, to say nothing of improvements, have been made. At the same time, there are a few stock types, about which the others cluster. If one wishes to enjoy the best of all there is in the sweet pea without growing what would appear to be an amateur variety test, it can easily be done by selecting the best representative of each type of color and growing them and them only. All classes and colors may be easily divided into

nine types each of which has a general characteristic of its own. By beginning with the dark purples, a graduation may be made to the whites, and from the whites again on to the bright reds. The dark purples may be taken as the first class, represented by Waverly. The striped purples may be considered second, of which Senator is an example. The lavenders may be called third, represented by the Countess of Radnor. The whites come fourth, of which Blanche Burpee and Emily Henderson are the most famous. The primroses, as Mrs. Eckford, may be counted fifth. Sixth come the white shaded with pink, as Blushing Beauty. Seventh are the striped pinks, as Mrs. Joseph Chamberlain. The orange pinks are eighth, as Lady Penzance and Meteor. Last are the rose pinks, which may be subdivided, one class a pure pink, as Her Majesty and Royal Robe, the other having orange besides the rose, as Firefly and Miss Hunt. Here is wide range of color, and of a high quality, all gained by simply growing nine or ten varieties of sweet peas. Respecting double sweet peas, it may be said that the doubles are generally strong strains and give a profusion of large bloom, most of which, fortunately, is single.

It is a great advantage, of course, in the purchase of anything to know just what to get, and when a wise man purchases, he gets the very best. At the Springfield Show, Mr. Hutchins and Mr. Burpee selected independently the four varieties which each considered the best. Mr. Hutchins' choice was, Her Majesty, Mrs. Eckford, Lady Penzance, Ramona. Mr. Burpee's choice agreed with this as to the first two, Her Majesty and Mrs. Eckford, but chose for the others, Mrs. Joseph Chamberlain and Blanche Burpee. A selection by either of these men, of course, carries much weight, but when they agree upon any one or two varieties as being the best of all, their choice is not to be disputed. Besides this, the Station experiment plot has been closely studied and the best representatives in all points of each of the classes which have been named above as they have grown here this summer, have been recorded. They are (in my opinion) :—

I. Dark purple.

1. Waverly.

2. Duke of Clarence.

II. Striped purple.

1. Gray Friar.

2. Juanita.

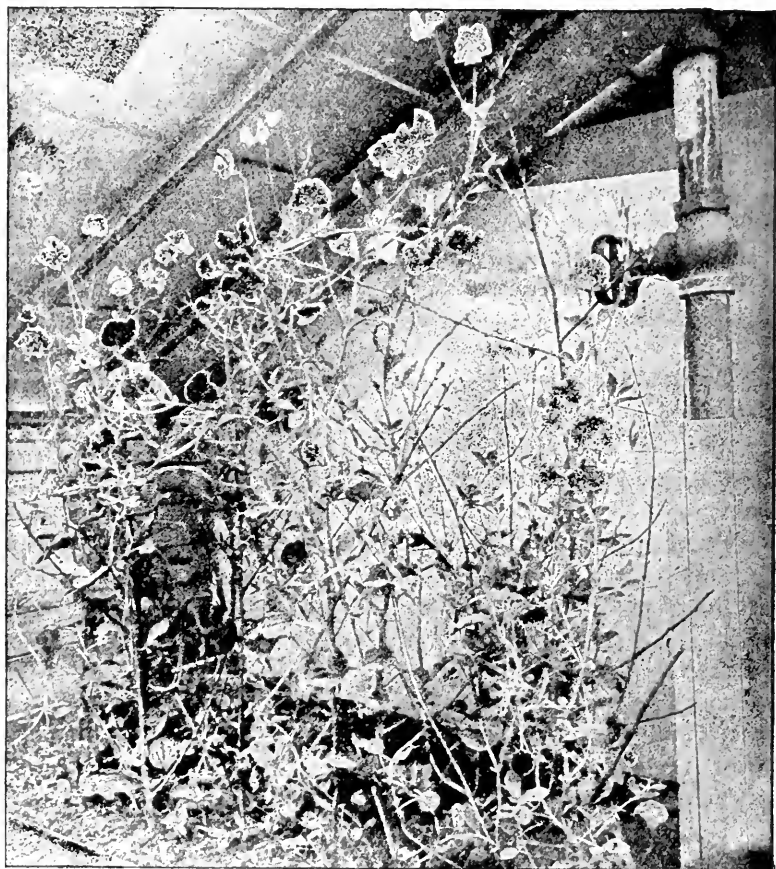
3. Senator.

III. Lavender.	1. Countess of Radnor.
	2. Lottie Eckford.
IV. White.	1. The Bride.
	2. Emily Henderson.
V. Primrose.	1. Mrs. Eckford.
VI. White flushed with pink.	1. Blushing Beauty.
	2. Katherine Tracy.
	3. Eliza Eckford.
VII. Striped or flaked pink.	1. Ramona.
	2. Mrs. Joseph Chamberlain.
VIII. Orange-pink.	1. Lady Penzance.
	2. Meteor.
IX. Rose-pink.	1. Her Majesty.
	2. Splendor.
IXa. Rose-pink shaded with orange.	1. Firefly.
	2. Princess Victoria.

These results are simply those of this experiment plot. Blanche Burpee, I suppose, ought to have come before Emily Henderson in the whites, but it has not come up to expectation here and consequently must drop out. No doubt the same is true of other varieties. Nevertheless we hope that in this list is the cream of most that is good in sweet peas. It is said that Emily Henderson is inferior to Blanche Burpee because it is notched, does not spread so freely, curls or reflexes to some extent, and has a tinge of green as the latter does not. Nevertheless, with us Blanche Burpee is not a useful flower. While full grown individual blossoms possess all the qualities said of it, most of the flowers do not spread or else fade before maturity, and consequently do not act the part expected of them. Of the striped pinks, Ramona and Mrs. Joseph Chamberlain ought really not to be compared, as they are of a wholly different shade of pink. Ramona may be put first only because it is perhaps the more refined. Mention of the dwarf Cupid must not be omitted. Cupid is not wholly a thing of beauty; Mr. Hutchins, however, considers it well worth the introduction historically. He wants it as the basis of future crosses with the tall varieties, that one may be enabled to procure the blossoms at a more convenient height.

I am greatly indebted to Mr. Hutchins for the time and patience spent with me over the flowers at the Springfield Sweet Pea Show. The flowers certainly deserve the work and enthusiasm which Mr. Hutchins has given to them. Although careless and

free, they are the product of much labor and thought. Their requirements, while not burdensome, are exacting. The earliest springtime is none too early for them to see the ground. They are sown deep or shallow according to the character of the soil, but so that their roots will be cool. They require the full sunshine to warm them, fertility to feed them, and rain to give them drink. Given these amenities, the sweet pea becomes the pride of the garden and the joy of the home.



23.—*Sweet peas in winter.* (See page 65.)

II. DESCRIPTIONS OF THE VARIETIES GROWN AT CORNELL IN 1896. (*A. P. Wyman and M. G. Kains.*)

NOTE.—These descriptions were made by Mr. Wyman directly from the Cornell patch in 1896, independently of former descriptions or others' opinions. When his notes were completed, they were placed in Mr. Kains' hands and he was asked to go over the plantation carefully and make whatever comments he thought proper. His comments are placed after Mr. Wyman's and are marked by a dagger (†). It will be noticed that the two men sometimes disagree widely as to the merits of varieties,—a fact which shows how futile it is to try to make any dogmatic assertions upon the merits of plants.

The name in parenthesis is that of the party who supplied us with the seeds. The asterisks (*) denote the Eckfords, and the year of introduction follows in some cases.

It is very probable that climate and season have much to do with the merits of sweet peas. Varieties which were "off" with us, or of mixed type, may have come from the best of seed.

The term "cropper" is used by florists to designate those plants or varieties which produce a heavy yield or crop at a certain time and thereafter flower very little or none.

L. H. B.

Adonis. (Morse.)

Poor; reflexed; medium size; poor substance; color rose-pink; bloom medium-profuse.

Height Aug. 6, six feet.

Said to be poorest of that color.

† Profuse bloomer, mid to late season.

Adonis. (Hutchins.)

Same as *Adonis* (Morse.)

Alba Magnifica. (Morse.)

Fair; expanded, notched, wings at a large angle; medium size; fair-good substance; color white; bloom medium-profuse.

Height Aug. 6, six feet.

† Best all round white in plantation. Better bloomer than *Blanch Burpee* or *Bride*, but has too short stems.

Alba Magnifica. (Hutchins.)

Same as *Alba Magnifica* (Morse.)

† A little better bloomer and has longer stems than above.

Alice Eckford. (Breck.)* 1896.

Good; reflexed, notched; large; fair substance; color, white lightly flushed with pink; bloom medium-profuse.

Height Aug. 6, five feet.

† With us like *Lemon Queen*. Buds greenish yellow; standard same tint when first opened, changing to the pinkish hue.

America. (Morse.)

Fair; expanded, notched; medium size; poor substance; color, heavily streaked crimson; bloom profuse.

Height Aug. 6, six feet, six inches.

† Crimson and white streaked. Has more crimson than Gaiety, Mrs. Jos. Chamberlain, Queen of the Isles or Red and White Striped, with which it forms a series. Mrs. Chamberlain is the lightest in color.

American Belle. (Breck.)

Is Apple Blossom.

Apple Blossom. (Morse.)*

Good; hooded; large size; good substance; color varies between purplish rose and light purplish pink; bloom profuse.

Height Aug. 6, six feet.

A standard. Would be "very good" if true to type.

† Variable, particularly in wings. Liable to be mottled. Mottling seems to be a seasonal defect or due to fertilizer. See *American Florist*, July 18, 1896, p. 1330.

Apple Blossom, double. (Burpee.)

Very good; hooded; large; good substance; color rose pink; bloom sparse-medium.

Height Aug. 6, four feet, six inches.

Occasionally double.

A good strain of Apple Blossom.

Black. (Morse.)

Poor; reflexed, notched; medium size; poor substance; color, claret, wings purple; bloom medium.

Height Aug. 6, five feet, six inches.

† Bloom profuse toward end of season. Poor at best.

Black and Brown Striped. (Breck.)

Poor; expanded or reflexed, notched; medium size; very poor substance; color, streaked claret, wings streaked reddish purple; bloom medium.

Height Aug. 6, five feet.

† Large size as a rule. Not an attractive variety.

Black Purple. (Breck.)

Is the Black.

Blanche Burpee. (Morse.)* 1895.

Good; expanded or reflexed; medium-large size; fair-good substance; pure white; bloom medium profuse.

Height Aug. 6, three feet, six inches.

Is a disappointment; produced very few fully expanded blossoms, those, however, of good quality.

† Size variable; substance, poor. Wings crumpled, unlike other whites in this respect. Larger than Alba Magnifica; poor bloomer.

Blanche Burpee. (Hutchins.)* 1895.

Same as Blanche Burpee (Morse).

† A little better than preceding.

Blanche Burpee. (S. S. P. Co.)* 1895.

Same as Blanche Burpee (Morse).

Height August 6, three feet.

† Largest and best formed white in plantation ; better than the preceding ; would rank it first of the whites if a better bloomer.

Blanche Ferry. (Morse.)

Fair ; expanded, notched, bold ; medium size ; fair substance ; color, standard crimson rose, wings rose purple, shaded or blotched on white in various degrees ; bloom profuse.

Height Aug. 6, six feet.

† An early "cropper," much mottled this year. See *American Florist*, July 18, 1896, p. 1330. Burpee's illustration on seed packets shows white wings. Very little white in our patch.

Blushing Beauty. (Morse.)* 1893.

Very good ; hooded ; large ; good substance ; color, delicate pink ; bloom medium.

Height Aug. 6, four feet, six inches.

Has a little more color than Alice Eckford.

† A favorite ; one of the best pinks.

Blushing Beauty. (S. S. & P. Co.)* 1893.

Same as *Blushing Beauty* (Morse).

Height Aug. 6, two feet, nine inches.

Blushing Bride. (Breck.)

Is *Blanche Ferry*.

Boreatton. (Morse.)*

Fair ; reflexed ; medium size ; poor substance ; color, claret, wings purple ; bloom medium—profuse.

Height Aug. 6, four feet, six inches.

† Very poor substance. Bloom profuse toward close of season. Cannot distinguish from *Stanley*.

Boreatton. (Hutchins.)*

Same as *Boreatton* (Morse).

Boreatton. (S. S. & P. Co.)*

Same as *Boreatton* (Morse).

Height Aug. 6, four feet, six inches.

Boreatton, double. (Burpee.)

Very good ; expanded ; large size ; fair substance ; color, claret, wings purple ; bloom sparse.

Height Aug. 6, four feet.

Did not double.

Same as *Boreatton*, of better size and substance.

† Some few doubles—both in wings and standard. Has more purple than single *Boreatton*.

Bride, The. (Lynch.)

Very good ; expanded ; large ; fair—good substance ; color, pure white ; bloom medium.

Height Aug. 6, five feet.

† About the same size as *Blanche Burpee*, but wings not crumpled. Poorer bloomer than *Blanche Burpee*.

Bronze King. (Morse.)

Fair; expanded, somewhat reflexed; medium size; poor substance; color white flushed or strongly blotched with a coppery hue, wings white or blotched with rose purple; bloom medium.

Height Aug. 6, six feet, six inches.

Butterfly. (Morse.)

Good; hooded, with sinuses at the sides; medium size; good substance; color white edged with mauve, flushed with lavender; bloom medium-profuse.

Height Aug. 6, five feet.

Butterfly, double. (Burpee.)

Good; hooded, with sinuses; medium size; fair substance; has a little more color than Butterfly; bloom medium.

Height Aug. 6, four feet, two inches.

Did not double.

† Only a few doubles.

Butterfly Improved. (Morse.)

Good; hooded, sometimes with sinuses; large; fair-good substance; has less color than Butterfly; bloom medium.

Height Aug. 6, five feet, three inches.

Sinuses less than in Butterfly.

Butterfly Winged. (Morse.)

Good; hooded, sometimes with sinuses; large; fair-good substance; has more pink than Butterfly; bloom profuse.

Height Aug. 6, five feet, six inches.

Wings curl separately.

Light Blue and Purple intermingled.

Captain Sharkey. (Breck.)

Like Invincible Carmine.

Captain Clarke. (Morse.)

Poor; expanded, erect, slightly notched, wings at a large angle; small; fair substance; color, white unevenly flushed with carmine, penciled with mauve, wings lavender; bloom medium-profuse.

Height Aug. 6, five feet, six inches.

Captain Clarke. (Hutchins.)

Same as Captain Clarke (Morse).

Captain of the Blues. (Morse.)*

Good; expanded, erect; large; fair-good substance; color, purple-magenta, wings purple; bloom medium-profuse.

Height Aug. 6, four feet, six inches.

Captivation. (Breck.)* 1896.

Good; expanded; medium size; fair-good substance; color, light pinkish purple; wings rose-purple.

In bud Aug. 3; had three blossoms Aug. 7.

Height Aug. 6, three feet.

† Larger than medium; late.

Cardinal. (Morse.)*

Fair; expanded, erect; medium-large size; poor substance; color, crimson-rose inclined to be blotched, wings purple-rose; bloom profuse.

Height Aug. 6, six feet.

† Small to medium. Cannot see difference between this and Capt. Sharkey.

Cardinal. (S. S. & P. Co.)*

Same as Cardinal (Morse), except the stock seemed to be poorer.

Carmen Sylva. (Hutchins).

Poor; expanded, erect, notched; small to medium size; poor-fair substance; color, white shaded with magenta, penciled with mauve, wings pinkish mauve; bloom medium-profuse; ugly.

Height Aug. 6, five feet, six inches.

† Very poor.

Carmine Invincible. (Morse.)

Fair; expanded; large; poor-fair substance; color crimson, wings purple-rose; bloom profuse.

Height Aug. 6, five feet, six inches.

† Distinct from Invincible Carmine.

Countess of Aberdeen. (Breck.)* 1896.

Not in bloom Aug. 3.

Height Aug. 6, five feet.

† No bloom Sept. 9.

Countess of Radnor. (Morse.)*

Very good; hooded; large; good substance; color, pinkish-lavender; bloom medium. Said to be running back to original blush tint.

Height Aug. 6, five feet, six inches.

† Very large. Bloom more profuse toward end of season. Handsome and distinct. See note under Dorothy Tennant.

Countess of Radnor. (S. S. & P. Co.)*

Like Princess May. A striped-purple intermingled.

Countess of Radnor Improved. (Morse.)

Same as Countess of Radnor. Madame Carnot intermingled.

Crown Jewel. (Breck.)* 1896.

Not in bud Aug. 3.

Height Aug. 6, four feet, six inches.

† Very poor; erect, notched; small to very small size; very poor substance, color, blush-pink with more or less bronzy finish on the standard. Bloom sparse.

Crown Princess of Russia. (Morse.)

Poor; expanded; small-medium size; poor substance; color, white lightly flushed with pink and primrose, wings flushed with pink; bloom sparse-medium.

Height Aug. 6, five feet, six inches.

Said to have a historical value only as being the first of the flushed pinks.

Cupid. (Introd. by Burpee, 1896. See Bull. 111, p. 182).

An interesting dwarf, growing about eight inches high, and worth growing as a pot plant, but of little value in the open. The flowers are small and white, and with us were scattered along through the season, at no time making a show. See page 73.

Daybreak. (Morse.)

Fair ; broadly expanded or reflexed, notched ; medium size ; poor substance, color, white clouded on the back with purplish rose, less clouded on front, with white margins, giving watered effect, wings white, occasionally blotched with rose-purple ; bloom medium-profuse.

Height Aug. 6, four feet, six inches.

Duchess of Edinburgh intermingled.

Daybreak. (Hutchins.)

Same as Daybreak (Morse), but unmixed type.

Delight. (Morse.)*

Fair ; expanded ; small ; fair substance ; color, white with a very light shade of suffused carmine ; bloom profuse.

Height Aug. 6, six feet.

† Poor.

Dorothy Tennant. (Morse.)* 1892.

Very good ; hooded ; large ; good substance ; color, pinkish lavender ; bloom medium-profuse.

Height Aug. 6, four feet, six inches.

† Much like Countess of Radnor, but a shade darker.

Dorothy Tennant. (S. S. & P. Co.)* 1892.

Like Dorothy Tennant (Morse).

Height Aug. 6 three feet.

Duchess of Edinburgh. (Morse.)*

Fair ; reflexed ; medium size ; poor substance ; color scarlet and rose, wings magenta ; bloom medium-profuse.

Height Aug. 5, four feet, three inches.

Duchess of York. (Morse.)* 1895.

Fair ; expanded or somewhat hooded ; large ; poor-fair substance ; color, white delicately flushed and streaked with purplish pink ; bloom sparse.

Height Aug. 6, four feet.

† Very poor bloomer.

Duchess of York. (S. S. & P. Co.)* 1895.

Like Duchess of York (Morse).

Height Aug. 6, four feet.

Duke of Clarence. (Morse.)* 1893.

Very good ; expanded, sometimes hooded ; large ; fair-good substance ; color claret, wings purple ; bloom medium.

Height Aug. 6, four feet, three inches.

Said to be the finest purple.

† Handsomest and largest purple in the patch.

Duke of Clarence, double. (Burpee.)

Very good ; hooded ; large ; good substance ; color claret, wings dark rose purple ; bloom sparse.

Height Aug. 6, five feet.

Did not double.

† Much like Boreatton but has more of a purple effect. Fully two-fifths of the blooms are double.

Duke of York. (Morse.)* 1895.

Poor ; expanded or reflexed, notched ; medium size ; poor-fair substance ; color, wine, wings rose purple ; bloom medium-profuse.

Height Aug. 6, four feet, six inches.

Duke of York. (Hutchins.)* 1895.

Same as Duke of York (Morse), except that Captain of the Blues is intermingled.

Duke of York. (S. S. & P. Co.)* 1895.

Same as Duke of York (Morse), except that the bloom is sparse.

Height Aug. 6, four feet.

Eliza Eckford. (Hutchins.)* 1895.

Very good ; hooded ; large ; good substance ; color white, more or less delicately flushed and shaded with rose, back strongly flaked with rose ; bloom profuse.

Height Aug. 6, six feet.

† Very handsome, and a favorite.

Emily Eckford. (Morse)* 1893.

Good ; hooded ; large ; good substance ; color, pinkish lavender ; bloom sparse.

Height Aug. 6, five feet.

Said that on the third day, the flowers have nearest to blue of any sweet pea.

† Very much like Countess of Radnor, but a poor bloomer.

Emily Henderson. (Morse.)

Good ; expanded, sometimes reflexed, notched, wings at a large angle ; small-medium size ; fair-good substance ; color, white with a greenish tinge ; bloom medium-profuse.

Height Aug. 6, four feet, three inches.

† Poorer bloomer than Alba Magnifica, and not so good a white, but has better stems. Appears like Queen of England but a poorer bloomer.

Emily Henderson. (Hutchins.)

Failed to germinate well.

† One seed grew. Same as above, but had smaller stems.

Emily Henderson. (S. S. & P. Co.)

Like Emily Henderson (Morse), except that the bloom is sparse.

Height Aug. 6, three feet, three inches.

† Smallest white in the patch ; not like two preceding.

Empress of India. (Morse)*

Is Blanche Ferry.

Etna. (Hutchins.)

Poor ; expanded, notched ; medium size ; poor substance ; color, purplish crimson, badly blotched, with darker center and light edges, wings rose purple ; bloom medium.

Height Aug. 6, five feet, six inches.

Fairy Queen. (Morse.)

Poor ; reflexed, wings at a large angle ; small-medium size ; poor substance ; color, white with carmine veins ; bloom medium-profuse.

Height Aug. 6, five feet.

Firefly. (Morse.)* 1893.

Very good; reflexed; medium size; fair substance; color, bright rose pink, sometimes inclined to blotch, wings rose purple; bloom medium.

Height Aug. 6, four feet, six inches.

Not first-class in all points, but best of its kind.

† Pretty, but not large or stable enough. An early "cropper."

Firefly. (Hutchins.)* 1893.

Same as Firefly (Morse), except that the bloom is profuse.

Firefly. (S. S. & P. Co.)* 1893.

Like Firefly (Morse.)

Height Aug. 6, four feet, three inches.

Firefly, Hooded. (Morse.)

Very good; expanded, tends to hood; large; fair substance; color, rose-pink; bloom medium.

Height Aug. 6, four feet, three inches.

Larger and better substance than Firefly.

Said to be same as Mars.

Gaiety. (Morse.)* 1893.

Good; expanded; medium-large size; poor-fair substance; color, white streaked with purplish rose; bloom profuse.

Height Aug. 6, four feet, six inches.

† The prettiest streaked bloom in the patch. More purple than the other streaked reds. (See note under America.)

Gaiety. (S. S. & P. Co.)* 1893.

Like Gaiety (Morse.)

Height Aug. 6, four feet.

Gray Friar. (Morse.)

Very good; expanded, slightly hooded; large; fair substance; color, white watered more or less with streaked red purple giving a grayish effect; bloom profuse.

Height Aug. 6, four feet, nine inches.

Evidently sported somewhat.

Purple Prince intermingled.

Harvard. (Breck.)

Is Ignea.

Her Majesty. (Morse.)* 1892.

Very good; hooded; large; good substance; color, soft rose pink; bloom profuse.

Height Aug. 6, six feet.

Ignea. (Morse.)* 1893.

Good; expanded; medium size; fair substance; color, crimson pink, wings purple rose; bloom sparse.

Height Aug. 6, six feet.

Ignea. (S. S. & P. Co.)* 1892.

Like Ignea (Morse.)

Imperial Blue. (Morse.)*

Is Madame Carnot.

† Poorer bloomer than Madam Carnot.

Invincible Blue. (Hutchins.) Saxton, 1881.

Good ; somewhat reflexed ; large ; fair-good substance ; color claret, wings purple ; bloom medium.

Height Aug. 6, six feet, four inches.

† Medium in quality.

Invincible Black. (Hutchins.)

Good ; hooded ; large ; substance fair-good ; color, claret, wings purple bloom profuse.

Height Aug. 6, six feet.

Invincible Carmine. (Hutchins.)

Fair ; reflexed ; medium size ; poor substance ; color, crimson-rose more or less blotched, wings purple rose ; bloom profuse.

Height Aug. 6, six feet.

Said to be practically Cardinal.

† Distinct from Carmine Invincible.

Invincible Scarlet. (Breck.)

Belongs with Invincible Carmine.

Indigo King. (Morse.)*

Good ; hooded, sinuses at the sides ; large ; good substance ; color, claret, wings purple ; bloom medium-profuse.

Height Aug. 6, six feet, three inches.

† Much like Mad. Carnot ; color not so uniform ; sinuses more constant and pronounced. Finer flower than Madame Carnot.

Isa Eckford. (Morse.)*

Poor ; expanded, notched ; medium size ; poor substance ; color, white flushed with pink ; bloom medium.

Height Aug. 6, five feet, three inches.

Isa Eckford. (Hutchins.)*

Same as Isa Eckford (Morse.)

Johanna Theresa. (Breck.)

Is Light Blue and Purple.

Juanita. (Morse.)

Very good ; expanded ; large ; good substance ; color, white streaked and shaded with pinkish lavender ; bloom medium-profuse.

Height Aug. 6, four feet, three inches.

A poor white intermixed.

† Only good ; lacks character.

Katherine Tracy. (Ferry.)

Very good ; expanded, notched ; medium size ; good substance ; color, shaded pink, bloom medium.

Height Aug. 6, four feet.

† Large size ; poor bloomer ; prettiest blush-pink in patch.

Katherine Tracy. (S. S. & P. Co.)

Like Katherine Tracy (Ferry.)

† Somewhat better than above; deeper in tint, and a better bloomer.

Lady Beaconsfield. (Morse.)* 1894.

Fair; expanded, notched; medium size; poor-fair substance; color, primrose, slightly flushed with purple-rose, wings lavender; bloom sparse-medium.

Height Aug. 6, five feet.

Lady Beaconsfield. (Hutchins.)* 1894.

Same as Lady Beaconsfield (Morse.)

Lady Beaconsfield. (S. S. & P. Co.)* 1894.

Like Lady Beaconsfield (Morse.)

Lady Penzance. (Morse.)* 1894.

Good; expanded, variously curled; medium size; fair substance; color, rose-pink with a slightly orange tint; bloom medium.

Height Aug. 6, five feet, three inches.

Stems tend to bend.

Lady Penzance. (S. S. & P. Co.)* 1894.

Same as Lady Penzance (Morse.)

Lemon Queen. (Morse.)* 1892.

Very good; expanded, notched; large; fair substance; color, white delicately shaded with purple-rose more or less suffused; bloom sparse-medium.

Height Aug. 6, five feet, three inches.

† Medium size; looks like Alice Eckford.

Light Blue and Purple. (Morse.)

Poor; reflexed; medium size; very poor substance; color, claret somewhat blotched, wings reddish purple; bloom sparse-medium.

Height Aug. 6, five feet, nine inches.

† Same as Black, except that the wings are a shade or so darker purple.

Little Dorrill. (Breck.)* 1896.

Aug. 3, has not budded.

† No bloom up to Sept. 9.

Lottie Eckford. (Morse.)*

Very good; hooded; large; fair-good substance; color, white edged and lightly shaded with lavender; bloom profuse.

Height Aug. 6, five feet, three inches.

New Lottie Eckford is the only Lottie Eckford now on the market.

† Excellent and distinct.

Lottie Eckford. (S. S. & P. Co.)*

Like Lottie Eckford (Morse.)

Lottie Eckford Improved. (Hutchins.)

Same as Lottie Eckford (Morse.)

Captain Clarke intermingled.

Madame Carnot. (Hutchins.)

Fair; hooded, sometimes with sinuses at the sides; medium size; fair substance; color, rose-mauve, wings purple; bloom profuse.

Height Aug. 6, six feet, six inches.

† Poor, even for a purple. The poorest sweet pea color; not so good as Indigo King, which might be Mad. C. improved.

Madame Carnot. (Burpee.)

Same as Madame Carnot (Hutchins.)

Senator intermingled.

Meteor. (Morse.)* 1895.

Good; reflexed or expanded; medium size; poor substance; color, orange-pink, wings soft rose pink; bloom sparse-medium.

Height Aug. 6, four feet, eight inches.

† Only medium in quality.

Meteor. (S. S. & P. Co.)* 1895.

Same as Meteor (Morse.)

Height Aug. 6, three feet.

Mikado. (Breck.)* 1896.

Seed did not germinate.

Miss Hunt. (Morse.)*

Fair; expanded; medium size; poor; fair substance; color, rose pink; bloom medium-profuse.

Height Aug. 6, four feet, six inches.

Monarch. (Morse.)*

Good; somewhat hooded; large; substance medium-good; color, claret wings purple; bloom sparse-medium.

Height Aug. 6, four feet, six inches.

Mrs. Eckford. (Morse.)* 1892.

Very good; expanded; large; good substance; color, primrose; bloom medium.

Height Aug. 6, four feet, nine inches.

† Finest of the yellow whites.

Mrs. Eckford. (Hutchins.)* 1892.

Same as Mrs. Eckford (Morse.)

Waverly intermingled.

Mrs. Eckford. (S. S. & P. Co.)* 1892.

Same as Mrs. Eckford (Morse.)

Height Aug. 6, three feet.

Aug. 4, one bloom.

*Mrs. Gladstone.**

Good; expanded; medium size; fair substance; color, white flushed and shaded with purple pink; bloom sparse-medium.

Height Aug. 6, four feet.

† Large size; poor bloomer; pink.

Mrs. Joseph Chamberlain. (Hutchins.)* 1895.

Very good; hooded; large; good substance; color, striped purplish rose on white ground; bloom sparse-medium.

Height Aug. 6, four feet, three inches.

† Bloom better toward close of season, but then only medium. Lightest of the striped reds. (See note under America.)

Mrs. Joseph Chamberlain. (S. S. & P. Co.)* 1895.

Aug. 4, not in bloom.

Height Aug. 6, one foot, six inches,

† Did not bloom.

Mrs. Sankey. (Morse.)*

Good; hooded; medium-large size; good substance; color, white lightly shaded with purplish pink; bloom sparse-medium.

Height Aug. 6, five feet.

† Poor bloomer.

Nellie Jaynes. (Hutchins.)

Is Painted Lady.

New Sunset. (S. S. & P. Co.)

Aug. 3, not yet budded.

Height Aug. 6, three feet.

† Did not bloom.

Novelly. (Hutchins.)* 1895.

Fair; expanded, notched; medium-large size; poor substance; color, orange pink, wings rose pink; bloom medium.

Height Aug. 6, four feet, three inches.

† Poor.

Oddity. (Morse.)

Very good; hooded; large; good substance; color, light rose pink; bloom profuse,

Height Aug. 6, four feet, three inches.

† Ground color, "light rose pink" with more or less conspicuous veining of deeper pink. Poor towards close of season.

Orange Prince. (Morse.)*

Fair; erect, expanded; small; fair substance; color, orange-pink, wings, rose pink.

Height Aug. 6, four feet.

Aug. 3, in bud.

Aug. 6, five blossoms.

† Very poor bloomer.

Ovid. (Morse.)* 1894.

Good; expanded; large; fair-good substance; color, rose pink; bloom sparse.

Height Aug. 6, four feet, six inches.

† Very poor bloomer.

Ovid. (S. S. & P. Co.)* 1894.

Same as Ovid (Morse.)

Height Aug. 6, three feet.

Painted Lady. (Morse.)

Poor; reflexed, notched; medium size; very poor substance; color, crimson and rose, wings rose purple, blotched more or less with white; bloom medium.

Height Aug. 6, four feet, nine inches.

Lemon Queen intermingled.

Peach Blossom. (Hutchins.)* 1894.

Good ; expanded ; medium size ; fair substance ; color, white shaded with purplish rose ; bloom medium.

Height Aug. 6, four feet, three inches.

Said to be hard to grow, but that the difficulty may be overcome by planting thin.

† Only medium in merit.

Peach Blossom. (S. S. & P. Co.)* 1894.

No bloom Aug. 4.

Height Aug. 6, three feet, nine inches.

Primrose. (Morse.)*

Fair ; expanded, notched ; medium size ; fair substance ; color primrose yellow ; bloom medium.

Height Aug. 6, four feet, three inches.

† Medium but constant bloomer.

Primrose. (Hutchins.)*

Same as Primrose (Morse.)

Princess Beatrice. (Morse.)

Good ; expanded ; medium-large size ; good substance ; color, shaded pink ; bloom medium.

Height Aug. 6, five feet.

Princess Beatrice. (S. S. & P. Co.)

Same as Princess Beatrice (Morse), except that the bloom is sparse.

Height Aug. 6, four feet, three inches.

Princess Louise. (Morse.)

Is Violet Queen.

Princess May. (Hutchins.)

Good ; hooded ; medium size ; good substance ; color, pink lavender ; bloom sparse.

Height Aug. 6, four feet, three inches.

† Very poor bloomer.

Princess Victoria. (Morse.)*

Good ; expanded, notched ; medium-large size ; fair substance ; color, light crimson, wings purple rose ; bloom sparse.

Height Aug. 6, four feet, six inches.

† Closely resembles Blanche Ferry.

Princess Victoria. (Hutchins.)*

Like Princess Victoria (Morse), except that the substance is not so good.

Princess of Wales. (Morse.)*

Good ; expanded ; large ; fair substance ; color, striped red mauve ; bloom, medium.

Height Aug. 6, four feet, six inches.

† Very good for a striped flower. Looks like Black and Brown Striped ; unattractive.

Purple Brown Striped. (Morse.)

Poor ; reflexed, sometimes notched ; medium size ; poor substance ; color, striped red mauve, wings striped purple ; bloom sparse-medium.

Height Aug. 6, four feet, three inches.

† Large; same as Black and Brown Striped, except that this is a little better bloomer; either this, or the seed is mixed. Flowers in two patches exactly correspond.

Purple Prince. (Morse.)*

Fair; expanded; large; poor-fair substance; color red mauve, wings purple; bloom sparse-medium.

Height Aug. 6, four feet six inches.

The Queen. (Hutchins.)*

Poor; reflexed; medium size; poor substance; color, light rose pink blotched, wings purple pink; bloom very sparse.

Height Aug. 6, three feet nine inches.

† Very poor all round.

Improved Queen. (Morse.)

Mixed Lemon Queen and Senator.

Queen of England. (Morse.)*

Fair; expanded, notched, sometimes with sinuses; medium size; fair substance; color white; bloom sparse.

Height Aug. 6, three feet nine inches.

† Blooms better toward close of season; medium; looks like Emily Henderson, but is a much better bloomer.

Queen of the Isles. (Morse.)*

Fair; reflexed, notched; medium size; poor substance; color, rose crimson striped on white ground, wings striped magenta; bloom medium-profuse.

Height Aug. 6, four feet, nine inches.

† Looks like Red and White Striped.

Queen of the Isles. (S. S. & P. Co.)*

Same as Queen of the Isles (Morse.)

Ramona (Morse.)

Very good; somewhat hooded; large; good substance; color daintily splashed rose purple on white ground; bloom medium.

Height Aug. 6, four feet, three inches.

Red and White Striped. (Breck.)

Poor; reflexed, notched; medium size; poor-fair substance; color, striped rose crimson, wings striped magenta; bloom sparse-medium.

Height Aug. 6, four feet, six inches.

Is Scarlet Striped.

Rising Sun.

Poor; reflexed, notched, wings at a large angle; medium size; poor-fair substance; color, light pink shaded to orange rose at center, wings rose purple; bloom medium.

Height Aug. 6, four feet, nine inches.

† Poor bloomer.

Royal Robe. (Hutchins.)* 1894.

Very good; expanded; large; good substance; color pink; bloom very sparse.

Height Aug. 6, four feet, three inches.

Aug. 3, in bud.

† Bloom sparse; size and substance medium.

Royal Robe. (S. S. & P. Co.)* 1894.

Same as Royal Robe (Hutchins.)

† Not so good a sample as Royal Robe (Hutchins.)

Scarlet Invincible. (Hutchins.)

Fair; reflexed; medium-large size; poor substance; color, bright crimson rose; wings rose-purple; bloom sparse.

Height Aug. 6, five feet.

† Closely resembles Blanche Ferry, but darker, if anything.

Senator. (Morse.)*

Very good; expanded; large substance; color, striped red purple; bloom sparse.

Height Aug. 6, five feet.

† Same as Black and Brown Striped in appearance, but is a poorer bloomer.

Senator. (S. S. & P. Co.)*

Same as Senator (Morse.)

Height Aug. 6, four feet.

Senator, double. (Burpee.)

Very good; expanded; large size; good-fair substance; color, striped purple; bloom sparse.

Height Aug. 6, five feet.

† Poor bloomer; a few doubles.

Splendid Lilac. (Morse.)

Poor; reflexed, notched, wings at a large angle; medium size; poor substance; color, shaded carmine, wings lavender; bloom profuse.

Height Aug. 6, four feet, nine inches.

Splendor. (Morse.)*

Very good; hooded; large; good substance; color, rose-pink; bloom profuse.

Height Aug. 6, five feet, three inches.

† Occasional doubles; very poor bloomer at close of season. It is a "cropper."

Splendor. (Hutchins.)*

Same as Splendor (Morse.)

Splendor. (S. S. & P. Co.)*

Same as Splendor (Morse.)

Height Aug. 6, two feet, four inches.

Splendor, double. (Burpee.)

Very good; hooded; large; good substance; color, rose-pink; bloom sparse.

Height Aug. 6, five feet, three inches.

Doubled somewhat ; mixed with Butterfly.

Stanley. (Morse.)* 1894.

Good ; expanded ; large ; fair substance ; color, dark rich rose maroon ; bloom medium-profuse.

Height Aug. 6, five feet.

† Looks like Boreatton.

Stanley. (Hutchins.)* 1894.

Same as Stanley (Morse.)

Etna intermingled.

Stanley. (S. S. & P. Co.)* 1894.

Same as Stanley (Morse.)

Venus. (Morse.)* 1893.

Very good ; hooded ; large ; fair-good substance ; color, white lightly flushed with pink-purple ; bloom sparse.

Height Aug. 6, three feet, nine inches.

Venus. (S. S. & P. Co.)* 1893.

Same as Venus (Morse.)

Vesuvius. (Morse.)

Poor ; reflexed, wings at large angle ; poor substance ; color, light purple shaded toward center ; wings rose-purple ; bloom medium-profuse.

Height Aug. 6, four feet, six inches.

† Small and poor.

Violet Queen. (Hutchins.)*

Poor ; reflexed ; medium size ; poor-fair substance ; color, white shaded with carmine, wings pink-lavender ; bloom medium.

Height Aug. 6, four feet, six inches.

† Size and substance poor.

Waverly. (Morse.)* 1892.

Very good ; somewhat hooded ; large ; good substance ; color, rose-claret, wings purple ; bloom medium.

Height Aug. 6, four feet, six inches.

† Very handsome for a purple ; the best of its color ; compares very favorably with Duke of Clarence ; room for both in purples.

Waverly. (Hutchins.)* 1892.

Same as Waverly (Morse.)

White Double. (Burpee.)

Fair ; hooded, sinused ; medium size ; fair-good substance ; color white ; bloom very sparse.

Height Aug. 6, three feet, nine inches.

Did not double.

† Very poor bloomer.

III. NUMERICAL NOTES ON THE SWEET PEAS.

(M. G. Kains.)

The sweet pea is always attractive. In all its varied forms and tints it is the same dainty charmer. There is no ugly sweet pea. It is, therefore, perhaps unfortunate that the words "poor" and "medium" are used; and that dates and figures, which have always an air of business, range themselves against such innocent victims. But in all variety studies some standard has to be adopted and even the sweet pea must submit. In estimating the attributes of a variety the popular scale of ten is used. A composite ideal is formed by choosing one variety as a standard of size, another of substance, and so on; then comparing the variety to be judged with this norm.

In the following table the name of the variety, and, in parentheses, the name of the grower are given. Then follow the date of first bloom, the season at which each variety was at its best on our grounds—early, medium or late—and the date of the last bloom. There were a few isolated blossoms after October 10, but the frosts of the eighth and ninth had reaped their harvest and the blooming season was past. After the date column, follow the height in feet, the length of stems in inches; then, on the scale of ten, the estimates on general productiveness of bloom and of seed, on relative size, and substance of flower.

In a collection of ten varieties the following might be chosen:

Blushing Beauty,
 Apple Blossom,
 Countess of Radnor, or Dorothy Tennant (substitute),
 Duke of Clarence, or Waverly (substitute),
 Boreatton,
 Eliza Eckford, or Katherine Tracy if it were a better bloomer,
 Mrs. Eckford,
 Ramona,
 Gray Friar,

and for a white either Queen of England or Alba Magnifica. Neither of these whites is equal in merit to those in the above list, but none of the whites are. These two have the least number of bad points.

Name.	1st Bloom.	Season.	Last Bloom.	Height, ft.	Length of stems, in.	Quantity of Bloom.	Production of seed.	Size.	Substance.
Adonis (Morse)	July 15	M.-L.	Oct. 10	7	7	8	3	5	4
Adonis (Hutchins)	July 10	M.-L.	Oct. 10	6	6	7	6	5	4
Alba Magnifica (Morse) ..	July 10	E.-L.	Oct. 10	6	3	8	6	6	6
Alba Magnifica (Hutchins)	July 10	E.-L.	Oct. 10	6	5	7	9	7	6
Alice Eckford (Breck) ...	July 18	Mid.	Oct. 10	5	7	5	5	8	6
America (Morse)	July 13	E.-M.	Oct. 10	6	6	9	7	7	4
American Belle (Breck) ..	July 10	Mid.	Oct. 10	7	6	7	7	10	9
Apple Blossom (Morse) ..	July 10	Mid.	Oct. 10	6	4	4	6	10	9
Apple Blossom Double (Burpee)	July 10	Mid.	Oct. 10	6	8	8	6	9	9
Black (Morse)	July 12	M.-L.	Oct. 10	7	9	9	2	5	4
Black and Brown Striped (Breck)	July 12	E.-M.	Sept. 5	6	7	8	6	6	6
Black Purple (Breck) ...	July 9	M.-L.	Sept. 5	6	9	8	3	5	4
Blanche Burpee (Morse) ..	July 15	Mid.	Sept. 5	3	3	7	4	6	4
Blanche Burpee (Hutchins)	July 11	Mid.	Sept. 5	5	5	7	3	8	6
Blanche Ferry (Morse) ...	June 30	Earliest	Sept. 5	6	4	7	9	6	6
Blushing Beauty (Morse) ..	July 14	Mid.	Oct. 10	5	7	7	4	9	8
Blushing Bride (Breck) ..	July 1	Early	Sept. 12	6	9	7	4	7	6
Boreatton (Morse)	July 13	Late	Oct. 10	5	8	8	4	6	3
Boreatton (Hutchins) ...	July 13	Late	Oct. 10	6	8	8	4	6	3
Boreatton Double (Burpee)	July 30	Late	Oct. 10	5	7	6	7	7	6
The Bride (Lynch)	July 14	Mid.	Oct. 10	5	5	6	4	8	7
Bronze King (Morse)	July 12	Mid.	Oct. 10	6	3	4	3	5	5
Butterfly (Morse)	July 9	Mid.	Oct. 10	5	6	6	5	8	7
Butterfly (Burpee)	July 14	Mid.	Oct. 10	5	8	7	6	7	7
Butterfly Improved (Morse)	July 14	Mid.	Sept. 28	7	4	7	8	7	7
Butterfly Winged (Morse) ..	July 14	Mid.	Sept. 28	6	9	10	6	9	9
Captain Sharkey (Breck) ..	July 9	Mid.	Oct. 10	6	2	7	5	4	6
Captain Clark (Morse) ...	July 8	Early	Oct. 10	6	9	8	5	4	5
Captain Clark (Hutchins) ..	July 8	Early	Oct. 10	5	3	8	4	4	5
Captain of the Blues (Morse)	July 12	Mid.	Oct. 10	5	3	4	2	7	7
Captivation (Breck)	July 29	Late	Oct. 10	4	9	4	7	7	7
Cardinal (Morse)	June 30	Early	Sept. 12	8	8	10	8	6	4
Carmen Sylva (Hutchins) ..	July 15	Mid.	Oct. 10	7	4	7	6	4	5
Carmine Invincible (Morse)	July 10	Mid.	Oct. 10	6	6	8	5	6	5
Countess of Aberdeen (Breck)	—	—	—	5	—	—	—	—	—
Countess of Radnor (Morse)	July 13	Mid.	Oct. 10	7	8	9	4	10	9
Countess of Radnor Improved (Morse)	July 14	Mid.	Oct. 10	7	6	4	2	10	9
Crown Jewell (Breck) ...	Aug. 31	Late	Oct. 10	4	—	—	—	2	2
Crown Princess of Prussia (Morse)	July 15	Mid.	Oct. 10	6	4	5	2	3	3

Name.	1st Bloom.	Season.	Last Bloom.	Height, ft.	Length of stems, in.	Quantity of bloom.	Production of seed.	Size.	Substance.
Daybreak (Morse).....	July 13	Mid.	Oct. 10	4	4	3	2	5	4
Daybreak (Hutchins) ...	July 11	Mid.	Oct. 10	6	5	5	4	5	4
Delight (Morse).....	July 13	Mid.	Oct. 10	7	4	6	4	3	4
Dorothy Tennant(Morse)	July 12	M.-L.	Oct. 10	6	6	4	3	9	8
Duchess of Edinburgh (Morse).....	July 12	Mid.	Sept. 22	7	3	7	4	5	4
Duchess of York (Morse)	July 22	Mid.	Sept. 22	4	3	4	4	7	6
Duke of Clarence(Morse)	July 16	Mid.	Oct. 10	5	7	6	5	8	7
Duke of Clarence, Double (Burpee).....	July 15	Mid.	Oct. 5	6	6	4	5	9	8
Duke of York (Morse)...	July 17	Mid.	Sept. 22	6	6	6	5	6	5
Duke of York (Morse)...	July 16	Mid.	Sept. 22	7	7	9	6	6	5
Eliza Eckford (Hutchins)	July 15	Mid.	Oct. 10	7	8	9	5	9	8
Emily Eckford (Morse).	July 16	Mid.	Oct. 10	7	5	3	3	9	9
Emily Henderson(Morse)	July 11	Mid.	Sept. 22	6	9	8	7	6	6
Emily Henderson(Hutchins).....	July 22	Mid.	Sept. 22	4	4	3	3	6	6
Empress of India (Morse)	July 16	Early	Sept. 22	8	4	6	6	6	6
Etna (Hutchins).....	July 13	Mid.	Oct. 10	6	4	6	5	5	4
Fairy Queen (Morse)....	July 10	Mid.	Oct. 10	6	4	7	3	6	5
Firefly (Morse).....	July 18	Mid.	Sept. 12	6	8	8	4	7	6
Firefly (Hutchins).....	July 14	Mid.	Sept. 12	7	7	8	3	7	6
Firefly, Hooded (Morse).	July 14	Mid.	Oct. 10	6	7	6	3	10	6
Gaiety (Morse).....	July 14	Mid.	Oct. 10	6	4	6	6	7	5
Gray Friar (Morse).....	July 1	Early	Sept. 12	6	9	6	8	9	6
Harvard (Breck).....	July 5	Early	Sept. 22	7	6	8	8	6	5
Her Majesty (Morse)....	July 10	Mid.	Sept. 22	6	7	8	8	9	8
Ignea (Morse).....	July 16	Mid.	Oct. 10	7	6	6	7	6	5
Imperial Blue (Morse)...	July 8	E.-L.	Oct. 5	8	6	8	8	6	5
InvincibleBlue(Hutchins)	July 14	Mid.	Oct. 5	8	6	8	9	6	6
Invincible Black (Hutchins).....	July 16	Mid.	Sept. 22	7	7	9	9	8	6
Invincible Carmine (Hutchins).....	July 11	Mid.	Sept. 22	7	7	9	8	7	4
Invincible Scarlet (Breck)	July 1	Early	Sept. 12	6	6	7	5	7	4
Indigo King (Morse)....	July 10	Early	Sept. 22	6	7	8	6	7	7
Isa Eckford (Morse)....	July 16	Mid.	Oct. 5	7	7	7	6	6	4
Isa Eckford (Hutchins)...	July 12	Mid.	Oct. 5	5	7	6	5	6	4
Johanna Theresa (Breck).	July 3	Early	Sept. 22	6	6	8	6	6	3
Juanita (Morse).....	July 15	Mid.	Sept. 22	4	7	8	5	8	8
Katherine Tracy (Ferry)	July 16	Mid.	Sept. 22	5	5	4	4	8	8
LadyBeaconsfield(Morse)	July 18	Late	Oct. 10	6	7	7	4	6	6
LadyBeaconsfield(Hutchins).....	July 14	Late	Oct. 10	7	8	7	4	6	6
Lady Penzance (Morse)...	July 15	Mid.	Oct. 5	6	6	8	5	7	6
Light Blue and Purple (Morse).....	July 12	Mid.	Oct. 5	6	5	7	7	6	3
Lemon Queen (Morse)...	July 16	M.-L.	Oct. 10	6	7	8	5	6	6
Little Dorritt (Breck) ...	—	—	—	4	—	—	—	—	—
Lottie Eckford (Morse)...	July 20	Late	Oct. 10	6	6	7	8	9	7

Name.	1st Bloom.	Season.	Last Bloom.	Height, ft.	Length of stems, in.	Quantity of bloom.	Production of seed.	Size.	Substance.
Lottie Eckford (Hutchins)	July 16	Late	Oct. 10	5	8	7	9	9	7
Madame Carnot (Hutchins)	July 12	Mid.	Oct. 5	6	5	9	8	6	5
Madame Carnot (Burpee)	July 12	Mid.	Oct. 5	8	7	10	8	6	5
Meteor (Morse)	July 15	Mid.	Sept. 22	7	5	9	5	5	3
Miss Hunt (Morse)	July 14	Mid.	Oct. 10	5	6	7	6	6	6
Monarch (Morse)	July 17	Late	Oct. 10	5	7	8	6	10	7
Mrs. Eckford (Morse)	July 15	E.-L.	Oct. 10	6	9	9	4	10	9
Mrs. Eckford (Hutchins)	July 14	Early	Oct. 5	6	8	8	5	10	7
Mrs. Gladstone (Morse)	July 17	Mid.	Oct. 5	6	9	8	6	8	8
Mrs. Jos. Chamberlain (Hutchins)	July 16	Late	Oct. 10	5	8	8	6	9	8
Mrs. Sankey (Morse)	July 22	Late	Sept. 22	6	5	4	3	7	7
Nellie Jaynes (Hutchins)	July 1	Early	Sept. 28	7	4	9	10	6	6
New Sunset (S.S.&P.Co.)	—	—	—	5	—	—	—	—	—
Novelty (Hutchins)	July 16	Mid.	Sept. 28	5	7	9	5	6	4
Oddity (Morse)	July 16	Early	Sept. 12	4	9	8	6	7	8
Orange Prince (Morse)	July 21	Late	Oct. 5	4	7	5	4	5	5
Ovid (Morse)	July 16	Mid.	Sept. 28	5	6	4	4	7	6
Painted Lady (Morse)	July 16	Early	Oct. 5	4	6	8	5	6	6
Peach Blossom (Hutchins)	July 15	Mid.	Sept. 28	6	8	8	6	6	6
Primrose (Morse)	July 16	Mid.	Oct. 10	5	5	8	4	6	6
Primrose (Hutchins)	July 16	Mid.	Oct. 10	5	5	7	5	6	6
Princess Beatrice (Morse)	July 12	Early	Sept. 22	6	5	8	5	6	6
Princess Louise (Morse)	July 14	Mid.	Sept. 22	6	5	7	4	4	2
Princess May (Hutchins)	July 14	Mid.	Oct. 10	5	8	4	6	6	5
Princess Victoria (Morse)	July 12	Early	Sept. 22	5	6	7	5	7	6
Princess Victoria (Hutchins)	July 15	Early	Sept. 22	6	6	6	5	7	5
Princess of Wales (Morse)	July 14	E.-M.	Sept. 12	5	6	8	5	9	7
Purple Brown Striped (Morse)	July 14	E.-M.	Sept. 12	4	6	7	7	9	7
Purple Prince (Morse)	July 17	Mid.	Sept. 28	6	7	7	6	7	7
The Queen (Hutchins)	July 16	Mid.	Oct. 10	5	6	6	4	5	5
Improved Queen (Morse)	July 22	Late	Oct. 10	6	8	4	1	—	—
Queen of England (Morse)	July 17	Mid.	Oct. 10	4	5	8	4	6	6
Queen of the Isles (Morse)	July 15	Mid.	Sept. 22	5	7	8	4	7	5
Ramona (Morse)	July 16	Mid.	Oct. 10	4	6	6	4	10	8
Red and White Striped (Breck)	July 16	Mid.	Oct. 10	4	6	7	6	6	6
Rising Sun (Morse)	July 10	Early	Sept. 12	5	5	6	7	6	6
Royal Robe (Hutchins)	July 21	Late	Oct. 10	6	5	6	5	5	5
Scarlet Invincible (Hutchins)	July 16	Mid.	Oct. 10	6	7	7	5	6	4
Senator (Morse)	July 21	Late	Oct. 10	6	6	6	4	10	9
Senator, Double (Burpee)	Aug 20	Late	Oct. 10	6	8	1	0	9	7
Splendid Lilac (Morse)	July 11	Early	Sept. 22	6	7	8	7	6	4
Splendor (Morse)	July 10	Early	Oct. 5	6	8	9	6	9	7
Splendor (Hutchins)	July 11	Early	Oct. 5	6	6	8	7	9	7
Splendor, Double (Burpee)	July 30	Late	Oct. 10	6	6	5	4	9	7
Stanley (Morse)	July 14	E.-L.	Oct. 10	7	9	10	5	8	4

Name.	1st Bloom.	Season.	Last Bloom.	Height, ft.	Length of stems, in.	Quantity of bloom.	Production of seed.	Size.	Substance.
Stanley (Hutchins)	July 14	E.-L.	Oct. 10	7	9	10	6	8	4
Venus (Morse)	July 16	Mid.	Oct. 10	6	8	6	3	8	7
Vesuvius (Morse)	July 13	Early	Sept. 12	5	6	7	4	4	4
Violet Queen (Hutchins)	July 17	Mid.	Sept. 28	6	4	7	5	4	2
Waverly (Morse)	July 20	Mid.	Oct. 10	6	6	6	6	10	7
Waverly (Hutchins)	July 10	Mid.	Oct. 10	7	7	8	6	10	7
Double White (Burpee) . .	July 15	Mid.	Oct. 10	4	7	6	7	6	5



Bulletin 128.

February, 1897.

Cornell University Agricultural Experiment Station,
ITHACA, N. Y.
HORTICULTURAL DIVISION.

A TALK ABOUT

DAHLIAS.



By WILHELM MILLER.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	-	Treasurer.
F. A. BUTLER,	-	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.

CORNELL UNIVERSITY, Ithaca, N. Y., Feb. 22, 1897.

HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY.

Sir.:—When I came to New York, now several years ago, I was interested in the dahlias which are to be seen in so many of the farm-yards. To me, coming from a newer country, the dahlia was mostly a thing of the books. At least, I had no personal interest in it, for wherever I had seen the plant growing, it had been planted in a merely incidental way as a part of some confused and impersonal garden. But in the country districts of New York it clings to the old yards like a memory ; and I knew that here the plant is a survival of the dahlia passion which overspread the country a generation and more ago. If the people loved this old flower so much as to cherish it in all these years of its unpopularity and neglect, I thought that we ought to improve it and refine it and let them grow it to their heart's content. So I have looked forward to the time when I might give a summer to it, but the summers are now too full to allow of such recreation. But an opportunity finally offered. The new strains of dahlias began to be advertized. Persons interested in the cultivation of it offered to coöperate in furnishing tubers, and I found the man who could catch the spirit of the experiment. I submit the result as a bulletin under Chapter 437 of the laws of 1896.

Although Mr. Miller may not agree, I do not consider the dahlia to be the chief merit of this bulletin. The best thing in it is the personal point of view. Flower-loving is sentiment and emotion, kindled with imagination. It depends vastly more upon the person than it does upon the flower. Some persons would like to love flowers but they do not know how ; and there are others who think that they love them because they know their names and how to grow them. But I suspect that no one ever really loves a flower when he is conscious of an effort to love it. When a person once places himself in full sympathy with nature and learns the art of seeing everything at its best, he is in position to reap the joy of a garden ; and it really does not matter so very

much whether the plants are dahlias, sweet peas or bull-thistles.

I am convinced that the farmers need education in flowers and other incidental things quite as much as they do in wheat or potatoes, for it is the lack of cheer and color and interest about the home which is largely responsible for the dissatisfaction of the young people with the country. The moment that a farmer begins to take a living interest in some restful occupation for his leisure hours will his interest in farm life begin to grow. Now and then, therefore, we like to drop a bulletin upon his table which will come as a solace and stimulant to his leisure hours, awakening memories and opening strange lines of thought. We cannot tell him directly how to get the most comfort from the gentler things of the farm, but we can take a familiar object for a narrative and a lesson; and if the dahlia has such an established place at the farmstead, it will be a good text for our purpose.

Aside from our desire to extend flower-loving and nature-study to the country, we are under obligations to the flower-trade, which is a most valued constituent and supporter of the experiment stations. I may say that members of the trade may obtain a sketch of the varieties we grew last year by writing us for it.

A curious incident of our dahlia studies occurred in connection with the American Institute Fair in New York, at which we made an exhibit of over 200 varieties. A florists' paper said that "the only commendable feature of this stand was the great number of kinds staged." Another horticultural journal said that it was "a very extensive collection of dahlias, but the blooms were not of exhibition quality." We had not supposed that such misconception of the office of an experiment station exists amongst the makers of public opinion. Surely it is no part of the business of a station to grow plants for mere exhibition. The growers themselves can do that, and they can usually do it much better than the experiment station can. The station's mission is to simply lay the truth before the people. It can have no favorites in varieties. If it exhibits at all, it is bound to show the poor and indifferent kinds along with the good ones. It is just as useful to point out defects as it is to point out merits. In studies of varieties, the experiment station is a realist. In our dahlia patch, all the varieties were given good soil and

good care, but nothing more; and when we showed them at Philadelphia and New York we took the varieties as they run, good and poor alike. If the varieties were not satisfactory, it is easy to see where the fault lies; and there is therefore all the more need for an experiment to show the actual status of the business. We have found, as the result of considerable experimentation in various lines of floriculture, that we do not often get the best stock which the dealers have. We often receive the tag-ends. If the dealers are willing that the varieties should be judged by such plants, we have no reason to object. It is of course, perfectly natural and proper that the originator of new varieties, or the exhibition grower, should retain his best strains for his own use, and for this reason the experiment station can never hope to equal the specialists in the quality of plants, even if such were its legitimate ambition.

We made our dahlia exhibitions upon the express understanding that the flowers were not entered for competition, and they were designed—as we supposed every one would know—as an illustrative and educational display of the kinds in the market, of the range in forms and colors and other features which the flowers possess, and of what the grower may expect of the plant; and we desired to collect information for our own use. The officers of the Institute evidently caught the spirit of the exhibition, for, unknown to us, they awarded the Experiment Station a bronze medal and a diploma for “a display of 212 varieties of typical dahlias.”

All these remarks are made, not as a defense, but simply to illustrate by a concrete example what an experiment station is for. Its purpose is to make records. It would clearly exceed its province if it were to grow plants primarily for “exhibition quality,” and the florists would no doubt be amongst the first to object to such competition.

L. H. BAILEY.



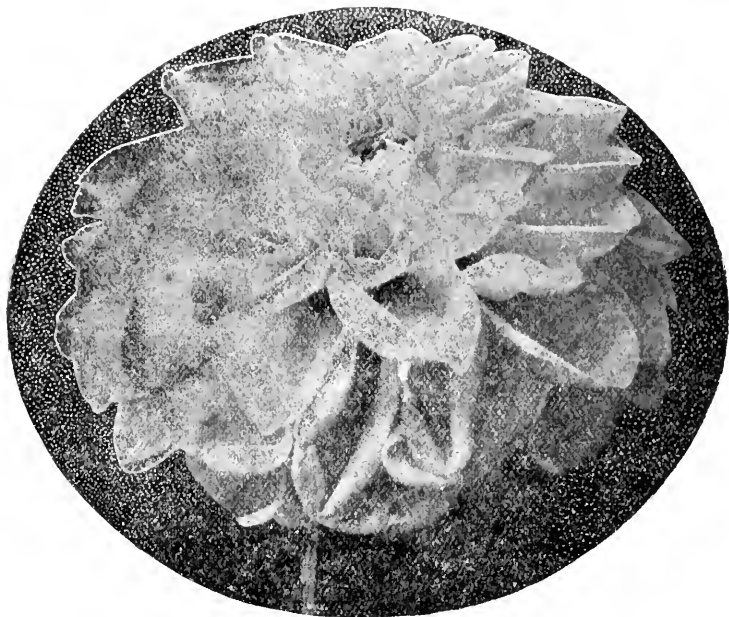
24.—*Mrs. A. Pearl.* A white cactus dahlia.

A TALK ABOUT DAHLIAS.

To very many people it will be news and scarcely credible news that dahlias have any freedom and grace of form, or any delicacy and modesty of color. The prejudice against them may never again be as strong as it is now. They are associated with a period of formalism which found its expression in highly artificial camellias, and in carnations from which the fringes,—their natural beauty—had been painfully removed by a long process of plant-breeding. The era of hoop-skirts was the time of the dahlia furore; and what a tyrant the dahlia was! It is still remembered as a flower the size of a croquet ball, almost as hard in outline, and with colors sometimes equally coarse and gaudy. How are the mighty fallen! The reaction against formal flowers carried the popular enthusiasm towards the loose, free, and fantastic Japanese chrysanthemums. Perhaps the deserted idol felt that the populace had gone off to strange gods. But I like to think that the poor dahlias breathed a sigh of relief when their convent days were over. They revelled in their neglect. It was bad enough to have their natural inclinations snubbed and suppressed. But it was very hard, after a period of success, to be accused of inherent primness and stiffness when those qualities were merely the result of their rigid system of education. The fault was not with the dahlias, but with the single standard of beauty that was in the minds of men. As a matter of fact the dahlia is probably able to express itself in as many wonderful and indescribable forms as the chrysanthemum is. But the dahlia has not had the chance. Chrysanthemums have been in cultivation, it is said, for over two thousand years. The double forms of the dahlia are less than a century old, and the so-called “cactus dahlias” which are going to save the whole race by their freedom and informality practically date from 1879, when the first cactus dahlia was exhibited and pictured in England. We already have many forms (Figs.

24, 32) which are surprisingly like some of the chrysanthemums, but the evolution of the dahlia is only just begun.

A brief history of the dahlia.—The first dahlias seen in Europe grew in the Botanical Gardens at Madrid in 1789. The seeds were sent from Mexico. The flowers were very much like that of Fig.



25. —*Miss May Lomas.* A large-flowered variety.

27, *i. e.* they had eight rays disposed in a single circle around the yellow disc. In 1814, the first double forms were produced at Louvain, Holland, after three years' work. All members of the composite family that have been through the process of doubling and have enough flexibility to entitle them to extended cultivation exhibit at least three strongly marked tendencies. One tendency is to reproduce the single forms (Fig. 27). This habit can be easily fixed and flowers of this type are called single varieties. Another tendency is toward the production of very large globular flowers that are completely double, as in Fig. 25. These large-flowering varieties are the hardest to produce and the hardest to maintain. They are always prized most highly because

the element of human skill is very large. A third tendency is toward what are called pompons. These are dwarf plants with spherical and double flowers like the last but much smaller and much more abundant. The single varieties are the most natural; the large-flowering and pompon varieties are in a larger measure the products of art. The dahlia was held pretty rigorously to these old and familiar lines of development, and unfortunately these somewhat conventional and artificial forms are still popularly supposed to be essential to the nature of the dahlia. The first double forms came to England in the winter of 1814, and in 1826 there were already sixty varieties cultivated by the Royal Horticultural Society. In 1841 one English dealer had over twelve hundred varieties.

This is a wonderful variation for a plant that had been in cultivation practically only twenty-seven years. Many other species have been in cultivation for more than a quarter of a century before showing any signs of "breaking the type" *i. e.* making a pronounced variation from their wild form. It also gives some hint of the extraordinary range of color, for the dahlia was permitted to display its color charms in but three forms, the single, the pompon or small sphere, and the big sphere of the large-flowering varieties.

In the forties and fifties variegated flowers were in great demand. Dahlias were striped, banded, speckled, penciled, dotted, blotched, and marked in all sorts of curious ways. There was as much ingenuity in the invention of these unstable compounds as is now displayed in designs for wall paper and oil cloths. These things were catalogued under the "Fancy" class, for the English divide the large-flowering varieties into "Show" and "Fancy." The "Show" section contains the "selfs," that is those varieties each of which has but a single color. The varieties of popular flowers that have unity of color-effect are usually longest lived; those having mixed color-effects are usually more unstable and are dropped out of cultivation when the popular enthusiasm goes elsewhere.

In the evolution of the dahlia too much attention has been paid to color and not enough to form. Those twelve hundred varieties of 1841 were too much like twelve hundred variously painted balls

of two sizes. How much better would it be to have thirty pure, distinct, single colors in forty different forms of expression !

There was not a single new or original idea in the evolution of the dahlia until 1873 at the very earliest, and whatever freedom or grace the dahlias now have is traceable to a single plant that



26.—*Grand Duke Alexis*. A large dahlia of peculiar form.

bloomed for the first time that year. Instead of short, stiff, artificially formed rays, this flower had long, loose, flat rays with pointed or twisted ends and the peculiar red that is associated with cacti. This variety was named *Juarezii*, in honor of Juarez, President of Mexico, and first offered for sale in 1874 by a Dutch merchant. This was the parent of the so-called cactus dahlias, a name which seems far-fetched now-a-days. It was the color

and not the form that gave the point to the comparison in the first place, and we now have a very great variety of colors in that form—colors that do not necessarily remind one of cacti. The white variety *Mrs. A. Peart* (Fig. 24), has a form very similar to that of the brilliant red cactus dahlia pictured in 1879. The cactus type has been kept quite pure, and of late years it has also been modified into some of the loose and flowing forms of the Japanese chrysanthemums. The cactus dahlias have also been crossed with specimens of the old ball type, and there have resulted such new forms as that of *Wm. Agnew* (Fig. 30), which may be taken as one type of a class that is sometimes called the semi-cactus. Whether the variety *Miss May Lomas* (Fig. 25), has any of the cactus blood in it (I had almost written *ichor*, for I believe it is an element of immortal youth), I cannot say. The rays are still short, and show the creases of the old strait-jacket, but on the whole, the outlines are considerably relaxed and softened. It would be puzzling to explain off-hand how such a form as that of *Grand Duke Alexis* (Fig. 26) may have arisen. This may look somewhat curious and mathematical in print, but in the living flower it has a peculiar charm and grace. I should like to see a whole set of dahlias of this form through the whole range of colors. In this case, there is no chrysanthemum that I know of quite like it. We have not attained as yet such freedom of form as is expressed in the tangled mass of golden threads known as the chrysanthemum *Mrs. W. H. Rand*, nor the serpentine grace in the long slender, writhing petals of *Medusa*.

The rays only have been developed in the case of the dahlia and the disc-flowers entirely neglected. The bewildering variety of forms in the chrysanthemums have their origin in two elements, the ray and the disc-flower. The chrysanthemum *Northern Lights* is composed entirely of very long slender tubes which are arranged in a loose, whorled fashion (see Bulletin 112, Fig. 94). It will be many years doubtless before the short, yellow disc-flowers of the single dahlia can be drawn out to so great a length. But it can be done, and there is no reason in the nature of things why we should not have a race of dahlias analogous to the anemone-flowered chrysanthemums, one of which, *Mrs. F. Gordon Dexter*, is figured on the title page of Bulletin 91. These effects

can certainly be produced, and it is probably only a question of time when we shall have all the shapes of the chrysanthemums.

Why and how dahlias should be changed.—Perhaps some one may ask, "Why do you wish to change the nature of the dahlia? If you are satisfied with the rose as such, and the lily, and would not try to make either like the other, why do you want to make dahlias look like chrysanthemums?"

The big round dahlia of the old school is not nature,—it is art. Or, at best it is only one type of beauty. Dahlias are not essentially big and round. It is their nature to vary into many forms. Of the forms that nature gives us, we select the ones we like and destroy the rest. There are at least two good reasons why the chrysanthemum-like forms would be desirable in dahlias; first, because the foliage is different, and flowers are entitled to different settings of foliage, just as precious stones may have their beauty set off in various ways. The foliage of the new cactus types is often distinctly graceful and beautiful. This, too, is good news for those who could not tell a field of dahlias from a field of potatoes at a moderate distance. Secondly, the growing of chrysanthemums in this climate is a highly specialized industry requiring greenhouses, capital and skill. Dahlias can be grown outdoors by everybody. Anyone can have them in his garden, and have lots of flowers, and at much less cost. It is a mistake to suppose that the best dahlias can be raised without skill and trouble. But while chrysanthemums will not tolerate ignorance or neglect, dahlias give an astonishing return for a minimum of work. Moreover the seasons are quite different. The first frost will always kill the dahlias out-of-doors while the chrysanthemums are preparing their November glories within.

These chrysanthemum-like forms are some of the best and most numerous that we have, and we cannot have too much of informal grace and beauty. We ought to have these types all the year round. The China-asters have many of these forms, as well as others not preserved among chrysanthemums and not yet achieved by dahlias, in a different set of colors, and at an intermediate season. They too have their place. These three genera, Chrysanthemum, Dahlia, Callistephus are not competitors, but friends that supplement one another, and of all the composites in

cultivation, they are by far the most promising and the most productive of new forms. They all have the same kind of materials to work with—ray and disc-flowers—and they are by nature fitted to express the same kinds of beauty. The rose and the lily have two other very different kinds of natural endowments and two very different types of beauty, not superior or antagonistic, but different.

The title-page of this bulletin illustrates a kind of beauty that is not usually associated with the dahlia. The gentleman who ordered this variety from Holland thought himself badly cheated because the flowers were small and only semi-double. It is true that semi-double forms often lack character, but sometimes they have prettiness and individuality, though they never get any prizes at the exhibitions.

The peculiar merits of the dahlia.—Meanwhile, what are some of the present advantages the dahlias possess? As to foliage, they have at least five times as much variety as the chrysanthemums do. They have the old familiar potato-like foliage, which is naturally rather broad and coarse. Much of this rankness, however, is due to methods of cultivation. Secondly, there is the new cactus type which is graceful and delicate enough to attract attention of itself. Between these two extremes there are many intermediate forms which the eye recognizes, but whose lines of beauty can scarcely be suggested by descriptions. Speaking only of very distinct forms, we have a very finely cut type of foliage of which *Fern-Leaved Beauty* is perhaps the best at present. Then there is still another type of foliage whose form is not so noticeable as its rich, dark red color. *Ami Barillet* has these dark reddish leaves with a single flower of cardinal. We had only one other variety of this type last year. Its single yellow flowers did not seem to go so well with this reddish foliage and perhaps some other colors may prove to be quite inharmonious with it. Here is a hint for one line of evolution for the dahlia. This reddish color is very uniform, and I am entirely convinced that it has a natural look and is not merely a curiosity. To me it looks much more at home in the garden than the purple beeches do on the streets. Finally, there is a tendency towards variegation in the dahlia leaf which seems to me fully as legitimate as the

whitened leaf-edges of many ornamental shrubs. It has appeared more than once in the history of the dahlia, and seems to be unstable and difficult to preserve. It is worth trying to keep, for at the least, it is attractive, and very agreeable for a change. The foliage of dahlias is undeniably monotonous, and a garden needs these lively touches now and then, not only to set off the genuine beauty of the more delicate forms, but also to lighten the general effect of the whole mass.

Coming now to the flowers, the old ball type is a capital form in itself, just the thing to display strong single colors, dazzling scarlet, vivid reds, big soft snowballs of white—a cool and pleasant handful—masterful yellows, rich golden yellow and truly regal purples. The form itself I have no quarrel with except that the rays are often too short and stiff and artificially folded. But I do protest against having only one ideal of beauty, just as we are advised to beware of the man of one book. A bed of old fashioned dahlias insolently interrupting the quiet restfulness of a green-sward with its loud, clashing colors, ought to be an audible protest against the man with one idea of beauty. Mere size alone in flowers is always vulgar. It is no wonder that the big dahlias are never seen in the windows of the New York florists. At the corner flower stands these huge things begin the day as big and hard as mallets. By night they have subsided into a soggy mournfulness. Women could no more wear them than a purple cabbage.

The show varieties indeed are chiefly designed for the exhibition-hall where great size is particularly admired; this is especially true of Europe, where dahlia-shows are still in high favor. It is impossible not to like some of these, but the garden is the place where they can be enjoyed most. They are a glorious sight in the sunlight, but they are inclined to look artificial indoors, and their colors are often changed or extinguished when brought into the house.

The pompons, however, are suitable for cut flowers, and their artificiality is attractive, quaint, or comical. They are like richly dressed children; their faces are very clean, and bright, and their tailor-made clothes are prim and neat or quaint and odd. Their formality is often pretty and amusing, as of those that imitate their elders. *Little Arthur, Little Bessie, Little Bobby, Little Charlie,*

Little Rifleman, *Little Valentine* and *Little Wag* are names of some pompons and there are many testimonies to their child-like grace and beauty. These pompons have been brought to a high degree of perfection. Their evolution is practically complete. They have a beauty and a place of their own, and no one would wish them any different. As a class, they offer the cheapest method I know of for producing great quantities of flowers two inches in diameter. A variety that does not have from ten to sixty flowers at a time from the 4th of July until the September or October frost is not worth keeping. They are the very thing for small yards and for certain city conditions, especially where people are likely to steal flowers. Anyone who enjoys giving away flowers should have some pompons. They grow up quickly and hide bare, ugly places and are the ideal for those people who delight in having things trim, neat and tidy. The peculiar merits of the pompon dahlias, then, are their profusion, their wide range of color, and their cheapness.



27.—A single dahlia

The single dahlias (Fig. 27) will probably be enjoyed as long as the star-like beauty of the daisies and marguerites is appreciated. They, too, are quite perfect in their way, and they are largely for quantity. Of late years the plants have been made dwarf and compact. There is now a whole race called "Tom Thumb Single Dahlias." I hate to talk about "improving"

flowers. It has a bad sound. To many people it is well-nigh sacrilegious to talk of "improving nature." Strictly speaking, we cannot create; we can only select from the forms that nature gives us, and keep what we like. Whoever declares that wild flowers are intrinsically more beautiful than cultivated ones, and insists on having dahlias just as they are in nature, must move



28.—*Viridiflora*. The green dahlia.

to Mexico, and will then find that the forms are not stereotyped. Nature can print "dahlia" in as many kinds of type as our best publishing houses can. Dahlias grow wild in Mexico in sandy places, at five or seven thousand feet above the sea level, know nothing of frost, and are used to a long dry season. They do vary wonderfully in Mexico and they are bound to vary even more so in New York. The dwarfing of dahlias is a perfectly legitimate thing. Nature does it, and we have a perfect right to prefer some

of her forms to others. I hate to see dahlias tied to stakes. The compact bushy plants that never grow more than two feet high have their flowers massed and make a single picture. The tall, ungainly, sprawling varieties have too much foliage in proportion to the number of flowers. There is no unity of effect. The flowers are scattered, and the attention is distracted. And the stakes are unsightly and troublesome. These dwarf dahlias, therefore, are just the thing for flower-beds and borders and wherever masses of color are wanted in small compass. The taller single varieties have been extravagantly overvalued in their day. They have even excelled the show varieties in popular favor for a time. Vilmorin still catalogues one hundred and eleven single varieties.

The peculiar merits of the cactus dahlias have been mentioned. Figures 26 and 30 are only two of many forms quite peculiar to the dahlia. The dahlia is not without its curiosities, such as sporting varieties, like *Beauty Inconstant* which bears pure white or pure yellow flowers, or pinkish ones, or red ones "freaked" with any of these colors, and *Viridiflora* the so-called "green dahlia" (Fig. 28), which is a monstrosity similar to the green rose. The range of color is even greater than that of the Japanese chrysanthemums, being particularly rich in dark reds and strong, clear shades of purple. The dahlia *A. D. Livoni* exactly matches the pink of Mr. Mathews's color chart and I am very sure that the chrysanthemums do not have it at all. Whether they can ever reach it through the color that Mr. Mathews calls crimson-pink is doubtful. Dahlias are also very rich in iridescent effects, *Ruby Queen*, *Oban*, and *Mrs. W. H. Maule* being good examples. The texture of flowers is a point wasted on people who do not love a garden. Dahlias are sometimes waxy, sometimes loose and fluffy, and a loving gardener loves to feel and handle them.

The place for dahlias is the garden.—They never can have a place in landscape gardening because the first frost kills them. I often think their strength is dissipated when they are strung along a walk or other border. Personally, I believe in flower beds, but not in the middle of a beautiful green lawn. The grass has a quiet story to tell, and if dahlias intrude they should be put out for disturbing the peace. I wish I could have a whole bulle-

tin in which to tell the fun of gardening. It cannot be enjoyed by proxy. I enjoy especially those gardens that have one theme, one central feature, no matter what are the modifications. A collection of roses, of sweet peas, of China asters, or of anything, has a certain unity, which, however, need not exclude minor features and miscellaneous favorites. Dahlias are the hobby of



29.—Rev. C W. Bolton, who connects the old-time dahlia *furor* with the returning passion.

the Rev. C. W. Bolton, of Pelham, near New York City. His house is a picture by itself and one would never suspect what treasures are in his back-yard. Mr. Bolton is an early riser, and takes rest and solid comfort in his garden. He has the pompons nearest to his house, for they are the boys and girls and he catches them playing games. There are cool grass walks between the double rows of big dahlias. Mr. Bolton is rich in dahlias and he has been their friend in need. Many a beautiful dahlia has he saved from oblivion. He loves color, and this is a beautiful and easy

way to get it. It is a cheap way of painting. No one can expect to raise such beautiful, large-flowering dahlias, unless he takes trouble, and no one is entitled to success who does not like to nurse plants and watch the flowers daily. Mr. Bolton's garden has been a good and cheap doctor. The pompons snuggle up against the gray walls of the church and make a warm and cheery picture.

Dahlias should be in a place by themselves. Possibly a dahlia can be used now and then "as an exclamation point," a flash of color to lighten up other foliage near a house or wherever a cheerful look is desired. The herbaceous border is no place for dahlias. Indeed the big ball type of flowers is rarely furnished

by the composites amongst perennial herbs. Blue-bells and columbines are typical inhabitants of the herbaceous border and their beauty is of a different sort from the big solid ball-like dahlias.

Dahlias as cut flowers.—While sweet peas can be picked indiscriminately and put in a single vase, dahlias have such a wide range of color that the flowers must be carefully sorted. This adds to the fun of arranging, and gives time to look at each one separately. A vase full of a single variety gives a strong and pure effect. It is a great mistake to jumble all sorts and colors of flowers into the same jar. The European and American ideas on this subject are entirely opposed. The German idea of a bouquet is too often a cluttered lot of miscellaneous flowers all huddled together without regard to conflicting colors and different types of beauty. Dahlias go well with nothing else. They keep fairly well for about three days, and take up great quantities of water through their succulent stems. Dahlia-shows can never be as popular in America as they are in Europe, until there is a greater variety in their forms. While the garden is the true exhibition place for dahlias, where one may revel and riot in their color, the dahlia-show is not to be discouraged. The large-flowering dahlias are just as worthy of separate notice as so many paintings. They are, in a sense, works of art and deserve to be studied individually. It is, therefore, a mistake to crowd them together in a bad light. Gas light particularly, deadens and falsifies the colors of flowers.

A few words on color.—I made the experiment of describing all the varieties this year by the aid of color charts. Kohn's color chart was given a fair trial but proved unsatisfactory. The color chart of F. Schuyler Mathews was very handy and helpful, although Mr. Mathews employs names which may be used by artists but will never be used by the flower trade. There were two fine single varieties which were among the very first to bloom and had flowers every day until the end of the season. One of these matched the scarlet of Mr. Mathews's chart perfectly, and the other was as near cardinal as petal and pigment can ever be. These two varieties then became the standard for all near shades of red. The same variety is often described in one catalogue as scarlet and in another as crimson; yet Mr. Mathews says there are fifty easily recognizable shades between them. The standards

for color must be within the dahlia itself, but the standards must first be chosen by some outside aid. If the American Dahlia Society would register all dahlias, and give each one an official description, using a cheap and sensible color-chart as a guide, people could have some idea of what they are buying. *Penelope* is described by Dreer as white, tipped with purple; by Pierson as white, delicately tinted magenta; by Rawson as pure white with violet tips, and by Peacock as pure white, delicately flaked with lavender. This illustrates the difficulty of determining a secondary color of which a small amount is present. By crowding together the petals with the hand the secondary color comes out more strongly. *Miss May Lomas* and *La France* (Maule's) belong to this same class. Their beauty lies in these delicate secondary tints which are all of purple origin and can never be fixed. Dilute purple sufficiently and you get what Mr. Mathews calls crimson-pink. This crimson-pink has two bad faults: it is inclined to be laid on unevenly in patches and veins instead of being evenly suffused, and it is so variable in quantity and quality as to make it a lottery what sort of a flower one is to get. There is only one pink dahlia I know of (for *A. D. Livoni* and *Ethel Vick* seem to be identical) that shows no trace of a purple or crimson origin. I shall not have a particle of faith in the stability of any other dahlia advertised as pink until I see it. *Mrs. Gladstone* is a very much praised variety and at Ithaca in 1896 it had a very beautiful and uniformly suffused light pink. I expected to recommend it as among the very best, and should surely have done so if I had not seen flowers from two other localities which betrayed the origin of this pink. They showed two different degrees of a hateful purple and I should never have supposed them to be the same thing. Whenever the words "lavender" "rosy-pink" or "violet" appear in descriptions of dahlias one may feel almost certain that they refer to this treacherous crimson-pink. Sometimes these tints are pretty well fixed, e.g. the lavender in *Arabella*.

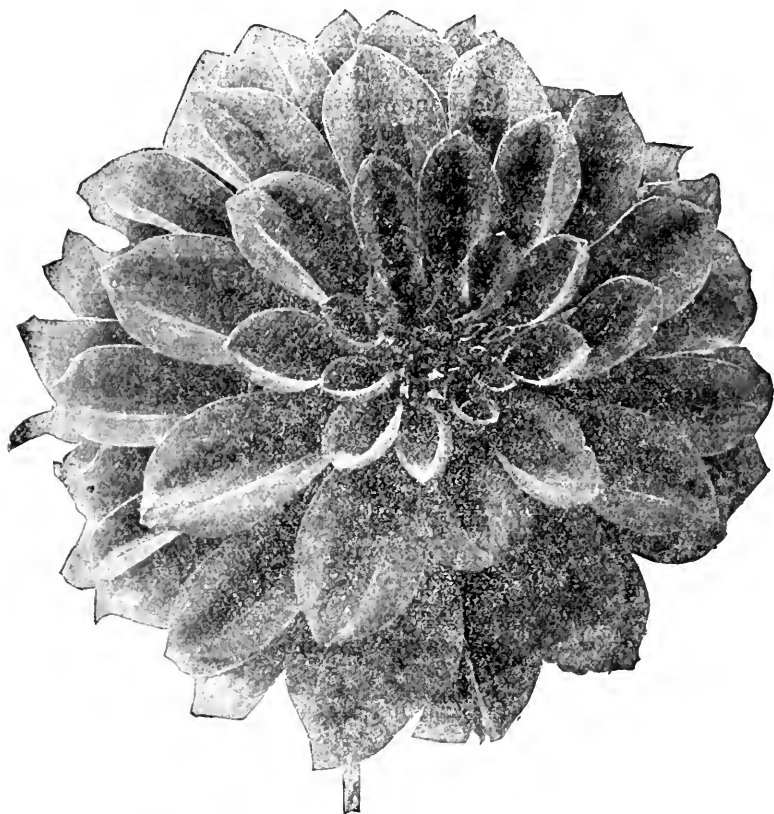
The variety commonly known as *Mme. Moreau* would pass for a pink until brought side by side with *A. D. Livoni*, when the purplish cast of the former is evident. In "selfs" i.e. flowers having but a single color, these shades are practically fixed and uniform, but variegated dahlias containing degrees of purple,

crimson, rose, magenta, violet, lavender and pink can never be relied upon from descriptions. They may be any one of these shades for they depend upon factors in cultivation which are little understood and perhaps uncontrollable. Pure and delicate shades of pink can never be reached by such means. Plant-food may deepen them all the way to purple in a single season and they are almost sure to revert to purple ancestors sooner or later.

Variegated flowers as a class.—Mixed color-effects can rarely compete for strength and brilliancy with singly colored flowers, and they are very unstable. "Selfs" have a unity of effect; their color is single, strong, undivided. Variegated flowers are distracting, and artificial, and remind one of the constant straining after effect. *W. C. Denzel* is one of the very few dahlias in which two colors are combined to give a soft and delicate single effect. If there is such a thing as a modest dahlia, this is surely one. It is distressing not to be able to recommend such a variety on a year's trial. Next year these same tints may deepen into a purple and a yellow that will conflict with each other. We have altogether too many variegated dahlias and not enough variety in form. They are essentially the most unstable, and the first to suffer from a popular reaction. These fanciful creations can never be permanently popular. The number of people who delight in formal flowers is certainly much greater proportionately in Europe than in America, and this leads me to make a plea for an American evolution of the dahlia. The forcing-house carnation is an American product. Carnations are grown mostly outdoors in Europe in beds and borders. They have short stems and a sudden rush of bloom in summer, and then all is over until another year. They are painted and penciled and marked in all sorts of ways foreign to our taste. Picotees can never have the permanent prosperity in America that they do in England; Americans want long-stemmed carnations the year round. We should never have had midwinter carnations at twenty-five cents a dozen if we had stuck to the old European lines of evolution.

The need of live colors.—It often happens that dahlias which are full of glowing color in the sunlight are very tame and subdued in the shade. Mr. Peacock the dahlia specialist of Atco, N. J.,

has done some intelligent crossing to produce live colors. The story of the variety *Wm. Agnew* (Fig. 30) is an interesting one. Mr. Peacock noticed that most of the reds he knew had no life out of the sunlight. He began with a large ball-shaped dahlia named *Crimson Giant* the great size of whose flowers he coveted. The



30.—*Wm. Agnew*. A fine scarlet orange semi-cactus variety.

pollen of this variety was used on *Professor Baldwin*, which is said to have been a sport from the original cactus dahlia. It had a scarlet orange flower, and Mr. Peacock had noticed that a touch of orange lightens up flowers wonderfully in the shade. This was a violent cross as the parents were as far apart in form as are figures 24 and 25. In the seedling the flower had the cactus-like

form of the female parent and the color of the male parent was modified to a deep scarlet. However, the flower faded badly. This seedling was now crossed with *Cochineal*, a ball-shaped flower of rich unfading dark red. *Cochineal's* only defect was an open center of yellow, and the flowers were only medium-sized. The rich dark red of *Cochineal* did not prevail in the cross, but the fading habit was eliminated in the product which is called *Wm. Agnew* (Fig. 30). The flowers are uniformly very large, of semi-cactus type, and of a fine intense scarlet orange color. The trace of orange thus subtly infused into the flower makes it a lively color in sun or shade. This variety was no earlier than the cactus sorts at Ithaca last year, but Mr. Peacock says it is a month earlier than the rest. This unexpected trait he cannot account for, but it is one of the greatest importance as the cactus sorts are often a month behind the old school dahlias in their blooming time.

Suggestions for plant-breeders.—1. The lengthening of the season of the dahlia is one of the most striking examples of its plasticity in cultivation. When dahlias were first introduced they bloomed for barely a week or two before frost. Now, they ought to be in bloom by the fourth of July and some of them at least can be made to blossom continuously from June 15th. The cactus varieties were on the average a month later than the rest at Ithaca, in 1896, and their season needs lengthening.

2. The ugly stakes must go. Already we have a race of single and pompon varieties that need no stakes to support them. Four feet is high enough for any dahlia plant. The cactus varieties particularly are inclined to be too tall and straggling.

3. While dwarfing in general is desirable, there is one kind of it that seems to me mistaken. *Triomphe de Solferino* is typical of a class used for bedding. It has huge flowers, coarse and flat-tish, and out of all proportion to the amount of foliage. I enjoy looking at cabbages,—in a cabbage plantation. I see no beauty in abnormally large flowers on abnormally dwarf plants. Here again nature gives the hint. The tendency to pompons means that a large number of small flowers is more in harmony with a compact plant than a few very large ones. I believe that extreme dwarfing of show varieties is mistaken craft and false art. The

variety named after Rev. C. W. Bolton is typical of a race of plants to be used for bedding which ought to be developed in America. *Triomphe de Solferino* has a thick stem which cuts like timber. One has to cut down nearly the whole plant and trim off the coarse, clumsy foliage in order to get two or three flowers, which are, after all, only vegetable curiosities and will not go into a vase. *Rev. C.*



31.—*Rev. C. W. Bolton*. Flower naturally four inches in diameter.

W. Bolton has a multitude of medium-sized flowers on long, slender stems just right for cutting. Three big flowers on a little plant distract the attention as would individual squashes, or pumpkins. Pompons have a unity of effect in their multitude of detail; and midget and lilliputian are prettier words than humpbacked dwarf.

4. The cactus varieties often have a trick of hiding their flowers under the leaves. This is no great calamity in the case of old fashioned bedders like *Triomphe de Solferino*. Here *Rev. C. W. Bolton* (Fig. 31) is again the type and the ideal, its many slender stems raising the flowers

above the foliage.

5. The whorled effect in *Priscilla*, *Blumenfalter* and others, must be pretty and novel to those who know only the old-time dahlias. Their so-called quilled rays are arranged in a circular or rotary fashion which gives a certain neatness and mock-military precision that is often pretty and attractive, particularly in young flowers, as in children playing soldiers.

6. In the march toward chrysanthemum-forms, the long, flat and slender rays will be of most help to get the free, loose, and fluffy types. Fimbriated forms, like *Guiding Star*, are desirable in themselves and may also aid in introducing irregularity. The rays of the old show dahlias are too short and stiff. Ragged, untidy and intermediate forms have possibilities.

7. We need more prizes for new forms and less effort to increase the range of color. Let the China-asters have the shades of blue. That is their mission. In *Gardeners' Chronicle*, 1879, John Keynes is quoted as saying: "The first good Dahlia I ever raised was Ovid, the seedling root of which I sold to Mountjoy for £50. I think we have never seen a nearer approach to a blue Dahlia." I have seen colored plates of varieties supposed to be on the way to blue. They were mostly shades of purple. I do not believe that an azure blue can ever be attained through either purple or lavender. Beware of crimson-pink.

8. We have as yet no forms like the tubular or Japanese anemone-flowered chrysanthemums nor many of the forms of China-asters illustrated in Bulletin 90. Apparently no attempt has been made to lengthen out the disc-florets into long, slender tubes.

9. *Princess Harry* and others may have the possibilities of a race similarly to the hairy chrysanthemums. The tendency towards hairiness appeared in England and was patiently suppressed before 1888 when the chrysanthemum craze was started in America by the purchase of the hairy variety *Mrs. Alpheus Hardy* for \$1500.

10. In addition to the five types of foliage already described (p. 109), there is sometimes a peculiar glossiness on the leaves which may perhaps be turned to account.

11. Dahlias are sometimes slightly fragrant, and at least one skillful plant-breeder is now at work along this line. Perhaps a few curiosities of this sort may be obtained, but the lack of fragrance is probably a natural limitation. Dahlias have glories enough without fragrance.

12. The buds often open with difficulty and make lop-sided flowers. Chrysanthemums sometimes have this difficulty and the same misfortune has been known to occur in other com-

posites growing wild. The dahlia, however, is notorious for producing many imperfectly blown flowers. Some think it is one of the limitations of the dahlia and must be endured. Others think that it has not been in cultivation long enough. Some varieties are nearly free from this trouble, but I do not know whether it is a matter of variety or cultivation.

The cultivation for dahlias.—In sandy soils dahlias make comparatively few tuberous roots, tend to become dwarf, and flower profusely. In very rich loamy soils they make more roots and fewer flowers. Too much nitrogenous food makes a rank, coarse growth and few flowers. No amount of added plant-food can ever atone for neglect of the physical condition of the soil. Mr. Peacock is able to have fifteen acres of dahlias in continuous bloom throughout a long summer of drought. Imagine this brilliant spectacle after nine weeks without a rain! And yet, dahlias are very sensitive to lack of moisture. While it is true that Mr. Peacock is an expert cultivator and devotes all his time to dahlias, yet like all skillful managers of the highest type, he has no professional secrets. The whole story is one of conservation of moisture already in the soil. Moisture is constantly rising by capillary action and its evaporation must be prevented. Frequent shallow cultivations break off the capillary tubes and prevent this escape of moisture into the air. This earth-mulch is obtained in the garden by lightly stirring the two or three inches of surface soil with a hoe or rake. Below that depth the soil should be constantly moist, not wet, throughout the whole growing season.

The large-flowering varieties need a space of four feet square to bring them to perfection as individual plants. The best results are gotten from planting them in rows so that they may be thoroughly cultivated. These rows should be at least five feet wide if a horse is to be driven through frequently.

There are three systems of training dahlias, that deserve notice. First, a policy of non-interference which allows as many shoots to come up from the roots as may. This is the proper way to grow most of the varieties catalogued as pompons, dwarfs, and bedders. In the large-flowering and cactus kinds, where fewer and more perfect flowers are desired, this method will not do, because the shoots compete with each other and exhaust the

vitality of the plant in producing foliage instead of flowers. The second method might be called the main trunk system. Only one shoot is allowed to grow from a clump of roots, all the other shoots being pinched off. This method, therefore, produces a tree-like growth, instead of a bushy form like the first. However, this system, which is the old-fashioned one, requires stakes and tying, for such plants will droop and split and are badly broken by high winds.

The third method is the "single stem branching system" which is successfully practiced by Mr. Lawrence K. Peacock and described in his book, "The Dahlia," at page 24. It is a most ingenious device for doing away with the unsightly stakes, and has many incidental advantages. All the shoots but one are removed, and this one is allowed to grow until two pairs of leaves are above ground with a young and unexpanded growth on the top. This undeveloped portion is pinched off, and four young buds which are lurking in the axils of the two pairs of opposite leaves are very much rejoiced. Some or all of them will now grow out into long branches. Let us suppose that all four of them grow equally. The plant will then have a very short, thick and strong single stem which comes up only an inch or two above ground and then gives place to four long branches. These branches are strong enough to hold themselves up without stakes and they can endure heavy winds. Indeed, a still greater division of labor is desirable, and each of these growing branches should have its terminal growth pinched out at the same early stage already indicated, *viz.*, when only two pairs of leaves are fully developed. Practically, however, plants do not grow in this mathematical way, for one of the two buds waiting for a chance, usually gets the start of his fellow and soon outclasses him. The practical thing to do is to keep the plants from making a main trunk. The object is to have the plants branch at the surface of the ground, and the pinching must be done as early in the season as possible. It is a common belief among gardeners that late pinching makes short-stemmed flowers, and early pinching gives the long stems so much desired. This system therefore, means work and watchfulness, but it causes less trouble than staking and tying.

It is best not to take up the dahlia roots for at least a week

after frost, as the tubers ripen better and are not so likely to shrivel when stored in the cellar over winter. The roots should be turned upside down in the sunshine to let the water drain out of the stems.

Cut flowers of dahlias can be shipped for at least three hundred miles if they are carefully packed in boxes six inches deep. They are sure to spoil if more than one layer deep. Moss must be used about the stems and the bunches should be small and securely wrapped with oil paper. They demand a great deal of room for long distance shipments. For short distances, they can be more compactly and easily handled.

A good word about frost.—The first freeze is sure to kill the dahlias, but frosts can be prevented. A freeze is a disturbance over a large area, and is usually associated with winds. A frost is a local affair, and comes on cloudless nights when no air is stirring. Frost is due to the quick radiation from the earth after night-fall. Clouds reflect this warm radiating energy. There are two ways of preventing the heat of the earth from quickly radiating off into space,—making an artificial cloud, and making the atmosphere moister than the soil. A few degrees of frost can be averted by simply sprinkling the plants thoroughly at night-fall. On large plantations it will pay to have a man stay up all night and keep a dense cloud of smoke constantly hanging over the field. This method is used among the vineyardists in parts of France. Neighbors are warned to expect frost by a system of alarm-bells. Foyers, or boxes of tar compounds, are lighted and make a dense smudge. The smell is enough to keep the attendants awake. Any damp rubbish that will burn with a great smoke will do. Some weeks after all the dahlias near Philadelphia were killed by the first frost an enterprising dealer was shipping from eight to ten thousand cut flowers of dahlias to the city every day. He had saved his plants by one night's work. It often happens that there is a light frost in early September and not another sign of frost for three or four weeks after.

The commercial possibilities are very great. It is the next flower to be urged upon the notice of the American public. The machinery of the floral trade is working for it. Quantities of dahlias have been given away by dry-goods stores, and

people are surprised that these new and graceful forms are those of dahlias. We cannot have too many flowers. It is pleasant to have lots to cut and lots to give away. The cactus dahlias are evidently to be the next great commercial success in the floral world. Popular enthusiasm may come and go, but their freedom and grace of form, and brilliant colors entitle them to permanent prosperity.

Origin of the cactus dahlia.—The following is the first description of the cactus dahlia, published in England. It is from the *Gardeners' Chronicle* for Oct. 4, 1879.

“At one of the recent meetings of the Royal Horticultural Society considerable attention was attracted to a remarkable Dahlia, exhibited by Mr. CANNELL under the name of the CACTUS DAHLIA. In the Dahlia as ordinarily seen the florets are rolled up so as to resemble so many short quills open at the ends, but in the present case the florets were all flat or nearly so, strap-shaped like the outer florets of the original species (ray-florets), and of a rich crimson colour. The appearance was, therefore, very striking, and suggestive of a new race in Dahlias analagous in some respects to the Japanese Chrysanthemums.”

The following is from the *Gardeners' Chronicle* for Nov. 8, 1879:

“DAHLIA JUAREZII.—When a short time since we figured this remarkable Dahlia from specimens sent us by Mr. CANNELL, we took some pains to ascertain its history, but with little result. Thanks to Mr. Krelage, of Haarlam, and Mr. Jongkindt Coninck, of the Tottenham Nurseries, Dedemsvaart, near Zwolle, we are now enabled to give the history of this Dahlia, as narrated by the introducer, in the Dutch journal *Sempervirens*.

“‘When reading the *Gardeners' Chronicle* of October 4, 1879, I was agreeably surprised to see a well-made figure of natural size of an old acquaintance of mine, Dahlia Juarezii. I was still more surprised to see by the few additional lines that very little is known about the origin of this beautiful Dahlia, be it a species or variety. I am, therefore, pleased to avail myself of the opportunity of giving a few details about its origin and history, and to say that I imported it directly from Mexico, and was the first who introduced it to the trade in the Netherlands as well as in other countries. In the autumn of 1872 a friend of mine in



32.—*Matchless*. A velvety maroon cactus dahlia. Half size.

Mexico sent me a small case containing different kinds of seeds, bulbs, and flower-roots from that country. The case was a long time on the road, and, as often happens with private importations, the plants arrived in a very poor condition ; the seeds were mixed, partially germinated, and spoiled ; the bulbs and flower-roots rotten. However, I kept all that was in a tolerable condition, carefully awaiting the result. At last, from a very small flower-root, a tender shoot developed itself, which soon proved to be a Dahlia. It being winter I could only make cuttings of it. Having taken great care of them, I was much pleased to obtain in the spring of 1873 a few young plants of this Dahlia. When planted out in June in the open ground with my other Dahlias, it flowered at the same time as these, and not only surprised me, but all who saw it in bloom, by its large rich crimson flowers, quite different from all other Dahlias. The brilliant red colour of its flowers nearly equaled that of the poppy, and was very showy even at a good distance. My catalogue of 1874, in which year I first introduced that Dahlia to the trade, will prove the truth of my assertions. In that catalogue it is mentioned for the first time under the name of Dahlia Juarezii, which name I gave it in honour of Mr. JUAREZ, then President of Mexico. The fact of Messrs. ANT. ROOZEN & SONS, at Overveen, deriving it from France, is easily understood, when I say that I yearly send to one of the leading French seedsmen a great many Dahlia roots, amongst which were some of Dahlia Juarezii. It is remarkable that the name of Cactus Dahlia should be used in the *Gardeners' Chronicle*, as in my catalogue of 1874, in which I first mentioned it, I said that its flowers when seen at some distance resembled those of *Cereus* (Cactus) *speciosissimus*. To maintain the honour of Dutch horticulture, I deem it desirable to write these few lines.—*J. T. Van der Berg, Juxphaas, near Utrecht.*''

Books, societies and dealers.—There are four books devoted entirely to the dahlia, of which only one is modern. "The Dahlia," by Lawrence K. Peacock, is an illustrated book of fifty-six pages. The books of E. Sayers, Boston, 1839 ; Joseph Paxton, London, 1838, and of Robert Hogg, London, 1853, are out of print and out of date.

The secretary of the American Dahlia Society is Lawrence K.

Peacock, Atco, N. J. The Secretary of the National Dahlia Society of England is T. W. Girdlestone, Sunningdale, Berks.

In order to answer the inquiries of our readers in advance, we give a list of American dealers who catalogue more than twenty-five kinds of dahlias, whose lists have come to our table:

A. Blanc & Co., 314 N. Eleventh St., Philadelphia, Pa.

Henry A. Dreer, 714 Chestnut St., Philadelphia, Pa.

John Gardiner & Co., 631 Market St., Philadelphia, Pa.

Peter Henderson & Co., 35 Cortland St., New York, N. Y.

Wm. Henry Maule, 1711 Filbert St., Philadelphia, Pa.

Samuel C. Moon, Morrisville, Pa.

Wm. H. Moon, Morrisville, Pa.

W. P. Peacock, Dahlia Specialist, Atco, N. J.

F. R. Pierson Co., Tarrytown-on-Hudson, N. Y.

Pitcher & Manda, Short Hills, N. J.

W. W. Rawson & Co., 34 South Market St., Boston, Mass.

John Saul, Washington, D. C.

The Storrs & Harrison Co., Painesville, O.

Vaughan's Seed Store, 84 Randolph St., Chicago, Ills., and 26 Barclay St., New York, N. Y.

James Vick's Sons, Rochester, N. Y.

W. W. Wilmore, Dahlia Specialist, Denver, Col.

The following is a partial list of foreign dealers who catalogue a great many varieties of dahlias:

England.

H. Cannell & Sons, Swanley, Kent.

J. Cheal & Sons, Crawley, Sussex.

Charles Turner, Slough.

Thos. S. Ware, Tottenham, London

Germany.

(Dahlias are commonly called *Georginen* in Germany.)

Max Deegan, Köstritz, Reuss-Thüringen.

Jaage & Schmidt, Erfurt.

Carl Kaiser, Nordhausen.

France.

L'Établissement Horticole Bruant à Poitiers (Vienne).
Vilmorin-Andrieux et Cie, 4, Quai de la Mégésserie, Paris.

New Zealand.

D. Hay & Son, Auckland.

The Cornell variety test of 1896.—Three hundred and fifty-four different named varieties were grown at Ithaca last year. There were over a thousand varieties catalogued in 1896 in different parts of the world. Our card-index has over two thousand names already, and no effort has been made to trace the older varieties back to their original descriptions. The Cornell University Library has all of the important horticultural journals and magazines complete, except the earlier volumes of *Gartenflora*. The *Gardeners' Chronicle* has accounts of dahlia-shows and descriptions of varieties from 1841 down to the present time. We should be very glad to receive any old books or catalogues containing descriptions of dahlias. We also desire varieties which are not on our list of varieties tried in 1896. The reader may be interested to know that we shall have growing next summer a good collection of the wild dahlias of Mexico.

Like all garden plants that have been idolized and neglected, the dahlia suffers greatly from having its names of varieties badly mixed. At least thirty-one of the varieties sent us have names that may mean two or more things each. It is also very common to find the same thing under different names. It is enough for present purposes to determine that *A. D. Livoni* and *Ethel Vick* are evidently two names for the same thing, without attempting to trace back the variety to its original description. The determination of synonyms is a work that takes years and implies a large collection of books, considerable expense, and the co-operation of the trade. *Arabella* and *Mrs. Peary* are two varieties that are said to have originated independently, but they are so nearly alike that both would never be desirable in small collections. They are typical of a class that are practically synonymous, but where there is a chance for individual judgment and preference.

The public should be cautioned not to expect the highest results the same year roots or plants are received. The quickest

way to get best results the same season is to order large clumps of roots from trustworthy firms that give prominence to the dahlia in their catalogues. Our dahlias were frequently cultivated and hoed in 1896, but were given no commercial fertilizers, the object being to judge them under ordinary conditions. This year they may be given extraordinary care and judged at their best. Many of the varieties produced no blooms at all in 1896. A. Blanc & Co. sent 79 varieties, containing mostly importations and very recent varieties which were received too late to be fairly compared with the rest. W. W. Wilmore, the dahlia specialist of Denver, Col., sent a large collection which suffered unjustly because it was detained indoors until some tardy shipments arrived which had been promised by a certain date. Henry A. Dreer sent 136 varieties, W. P. Peacock 58, and James Vick's Sons 8 varieties.

Of all these varieties there were about sixty that behaved well the first year and which seemed to be quite perfect in their way. I had hoped to say a good word for all of these, but the list has been sadly cut down in several ways. In the first place, there were many names which may mean two or more things. *Dandy* is the name of an English and an American large-flowering variety and also of a pompon. Cannell gives two varieties named *Hector*, one directly following the other. Secondly, we received the same thing under different names. *Maud*, *Marguerite* and *Model of Perfection* produced the same kind of a magenta flower, altogether the best of that color in the large-flowering class. Thirdly, I do not feel safe in recommending any variety with crimson-pink in it, not even the variety commonly known as *Mme. Moreau*. This is a very serious matter and has come up in the chrysanthemum test in a curious form. Some of the very best and purest white flowers we had were described as pink in the catalogues. Fourthly, at least five of the very best sorts which were used as color standards turned out to be not true to name. I should be glad to recommend these varieties if I could be sure of the names. Fifthly, there are certain parts of the color range that seem to be very much over-crowded. Dahlias are singularly rich in purples and dark reds. The competition is so great that there are often a dozen or more kinds with differences minute enough to show different origins but too nearly alike in

general effect to allow all to survive. Some of these are sure to go sooner or later, and the sooner the better. In such cases it is often simply a question of individual preference. In the case of some fifteen pompons where judgment has been suspended, the problem has resolved itself into a mere matter of relative profuseness. The prolific habit is sometimes fixed in the variety, and sometimes varies from year to year according to cultural conditions. This important character cannot be determined in a single year.

Some of the best known varieties are sadly missing from the recommended list, simply because of their behavior in this one locality. It is very trying to keep silent about *Red and Black*, a beautiful banded cactus variety because it was not prolific enough at one place, one year. We must have a high standard, particularly of profuseness. It is also hard to deny myself the pleasure of putting *Clifford W. Bruton* and *Mrs. W. H. Maule* in the recommended list, on the strength of seeing them elsewhere. These varieties were not sent to us. The former is by all odds the purest yellow of any large cactus I know of. The latter has a red flower with a wonderful bluish cast, giving an iridescent effect. Then again, there are many good varieties which are not recommended simply because there are better ones in sight or to be hoped for. *Sternfalter* and *Glare of the Garden* are examples.

I do not believe the general public needs more than three hundred of the two thousand or more varieties now offered by name, but I suppose that there are at least three hundred varieties so pronounced and individual that no one could wish them any different. Let us suppose that there are seven factors that make a variety desirable :

Height—say five degrees, between very dwarf and very tall.

Foliage—at least five types.

Form of flower—say three types, that of *D. variabilis*, *D. Juarezii*, and of forms intermediate between these two species.

Doubleness of flower—say only two degrees.

Size of flowers—say only two degrees, large and small.

Color of flowers—say thirty easily recognized colors.

Variegation—say ten styles of marking.

The man with one standard of beauty ought to blush for shame at the suggestion of the combinations made possible by the mul-

tiplication of these factors. But I fear that he has no imagination and cannot see how there may be three hundred or more types of beauty, each of which is true to an ideal and leaves nothing left to wish for. Take it or not, but do not say one is better than another. It is all a matter of individual preference. For these reasons the inevitable question, "What are your twelve best varieties?" is something of a temper-tester. But it is a perfectly fair question if it implies individual preference and disregard of curiosities and varieties for special purposes. It is a very practical one, and here is the answer that I give based on one year's behavior of the plants:

Mrs. A. Peart, cactus, white.

Nymphaea, cactus, pink.

Wm. Agnew, cactus, scarlet orange.

Maid of Kent, cactus, scarlet and white.

Black Prince, cactus, dark red.

Grand Duke Alexis, large flowered, chiefly white.

A. D. Livoni or *Ethel Vick*, large flowered, pink.

Rev. C. W. Bolton, large flowered, variegated, red and yellow.

Fern-Leaved Beauty, large flowered, banded, red and white.

Guiding Star, pompon, white, imbricated.

Vivid, pompon, scarlet orange.

Ami Barillet, single, scarlet.

The following varieties are recommended on the basis of a year's behavior at Cornell:

SECTION I. SINGLE VARIETIES.

A. Foliage reddish.

Barillet, Ami. Dark scarlet; not up to the standard of profuseness. Curious, and interesting to amateurs and plant-breeders.

AA. Foliage green.

Scarlet.

Downie, John. Very early, and very productive; stems suitable for cutting.

Scarlet orange.

Fife, Duchess of. Quite productive especially in latter part of season; suitable for cutting.

Cardinal.

Cowan, John. Very early and very productive; stems suitable for cutting.

Crimson.

Gartenfalter. Dark crimson; a strong color, and quite pure at close of

the season ; not everyone likes this color ; too late to be an ideal variety, although it was productive enough late in the season.

SECTION II. POMPON VARIETIES.

A. Type not fixed ; quality, quantity and position of colors variable.

Beauty Inconstant. White, yellow and various shades of red or pink ; two or more colors may be combined in the same flower ; very attractive ; was not as prolific last year as Pompons should be and commonly are.

AA. Type well fixed.

B. Rays cut, or imbricated.

White.

Guiding Star. The nearest to pure white in this class that I know of. There is a little yellow at the base of each ray which ought to be eliminated to make the variety entirely perfect.

BB. Rays not cut, or imbricated.

C. Colors single.

Orange.

Kleine Domitea. Early, prolific.

Scarlet Orange.

Vivid. Perhaps the most intense and brilliant color of all tried last year ; not as productive as the average pompon in 1896. Possibly the color is nearer to pure scarlet than scarlet orange.

CC. Colors, two or more.

Whitish, shading to crimson.

Little Najade. Recommended chiefly because very early and very prolific. In small collections the choice would be merely one of preference of color between this and *Eleganta*.

Pinkish.

Eleganta. Face shades of jacqueminot (Kohn), reverse pink (Mathews). The nearest approach to a pure pink I know of in this class, taking *A. D. Livoni* as the standard of pure pink among dahlias.

SECTION III. LARGE-FLOWERING VARIETIES.

A. Leaflets deeply lobed.

White, margined red.

Fern-Leaved Beauty. Flowers too few, and small for an ideal commercial variety. This is of the greatest interest to the amateur and plant-breeder. **Habit** dwarf. Suitable for bedding.

AA. Leaflets of the common type *i. e.*, not deeply lobed.

B. Colors single.

White

Purity. The nearest to pure white in this class, that we had. There is a slight amount of yellow at the base of each ray which tones the general effect very slightly and should be eradicated from the ideal white. Early, prolific, and habit ideal. Excellent for cutting.

White, suffused blush pink.

Ruth. The pinkish tinge is so faint as to allow the flower to pass for a white at a little distance. In small collections it would be an equal choice with *Purity*. Must be distinguished from *Miss Ruth*.

Yellow.

Pluton. Very early and very prolific, far more so than any other yellow dahlia of the old school in trial of 1896. Rather formal and stiff. For some reason it was often not double enough with us to be entirely globular.

Buff.

Crown Prince. Flowers very large, late, and rather few. The plant was one of the very tallest. Foliage very coarse.

Pink.

Livoni A. D. Pure pink with no trace of a secondary color. Flowers medium sized, profuse. *Ethel Vick* seems to be exactly the same thing.

Scarlet.

Blaine James G. Flowers early, very large, and very profuse. Great size does not seem to bring coarseness or vulgarity.

Purple.

Honest John. A peculiar shade, not the ordinary purple. Early, very prolific. Habit very good. This is a very attractive variety and most people like it.

Salmon.

Askins, Mrs. Reverse salmon pink; flowers sometimes freaked with pinkish rays; late and rather few blooms in 1896; described by Wilmore as "deep fawn."

BB. Colors two.

C. Both colors on some of the rays.

White and lilac.

Ataxis, Grand Duke. Late and scanty bloom in 1896; this is well worth the having for amateurs even if there should be only two or three flowers; I know of no other dahlia having this particular form; inner rays tipped lilac.

CC. Both colors on all rays.

D. Shaded; i. e. colors about equally divided between lower and upper half of face of each ray.

Purple and magenta.

Ruby Queen. Purple madder brown shading to dark purple and magenta; The coloring is very rich and bears close inspection; it was very attractive and made about an equal number of friends and foes in 1896.

DD. Variegated; i. e., streaked and dotted.

Yellow, streaked cardinal.

Bolton, Rev. C. W. Very early and very prolific; flowers borne well above the dwarf, compact, bushy foliage, on long slender stems suitable for cutting. Easily the best variegated dahlia of the globular type in the trial of 1896.

Straw, streaked magenta.

Fawcett, Lucy. Early; prolific; tall and suitable for cutting. There are really two secondary colors beside the straw-colored ground and sometimes the flowers come "solid" in either of these secondary colors; these varia-

tions have been saved and perpetuated. The variability is one of the good features of this variety for amateurs.

Maroon.

Sladden, John. Very dark maroon. This gave few and late blooms in 1896 at the Cornell Experiment Station. If I could have only two dark colored flowers of the globular type I should select *Honest John* as being dwarfer, earlier and more productive.

DDD. Margined.

White, margined, cherry red.

American Flag. Flowers never more than medium sized, and not early in 1896. Moderately productive. Type pretty well fixed; well named and always attracts attention.

SECTION IV. CACTUS VARIETIES.

A. Flower stems drooping.

Yellow.

Lemon Giant. Light yellow; flowers very large; flower stems very long, slender and naturally drooping.

AA. Flower stems erect.

B. Colors single.

White.

Peart, Mrs. A. See Fig. 24.

White.

Patrick, Henry. This was late and produced many imperfectly blown flowers. *Harry Freeman*, which Turner, 1896, p. 20, says is an improvement on *Henry Patrick* was a week later and otherwise much the same as regards flowering. The habit is different. No small garden needs both.

Scarlet.

Kynerith. Dark scarlet, edged cardinal.

Scarlet.

Agnew, Wm. Scarlet toned with an infusion of scarlet orange. Much earlier than its class and prolific; color very brilliant in sunshine or shade. Redder than the variety *Orange Scarlet*.

Salmon.

Michell, Henry G. Reddish salmon; flowers very large.

Salmon.

Little Cactus. Has the dwarf habit and small flowers of a pompon but hardly sufficient profuseness. Seems to have possibilities for the plant-breeder.

Red.

Black Prince. The darkest red I know. Form peculiar and interesting. The rays are like the sides and bottom of a long slender box.

Magenta.

Rosacactus. (Deegen, 1892, p. 5, No. 4019.) Rosy magenta, a color displeasing to some. Early and very prolific. Flowers very large and very few imperfectly blown.

Maroon.

Bragg, John. Purple madder brown ; usually described as dark maroon, nearly black.

Matchless. Velvety maroon.

BB. Colors two or more.

Red and White.

Maid of Kent. The shade of red is between scarlet and cardinal. It shades through pink to a brilliant white. The texture and luster are very remarkable. Form about half way between the globular and cactus type.

Salmon and pink.

Oban. Salmon and crimson pink, iridescent, a peculiar and delicate combination of colors. Described by Peacock as rosy lavender, overlaid delicate silvery fawn. The variety sent as *Ernst Kelway* was identical with this. *Lady Marham* is similar but has more of the rose color.

Pink and white.

Nymphæa. Shell pink, inner rays at times nearly white. Sometimes slightly fragrant. These flowers in a vase are often compared to water-lilies. It is perhaps the most famous of American varieties and has had much to do with bringing about a revival of interest in dahlias.

WILHELM MILLER.

Bulletin 129.

February, 1897.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

CHEMICAL DIVISION.

HOW TO CONDUCT
FIELD EXPERIMENTS
WITH FERTILIZERS.



By G. C. CALDWELL.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk About Dahlias.
129. How to Conduct Field Experiments With Fertilizers.

CORNELL UNIVERSITY, Ithaca, N. Y., Feb. 27, 1897.
HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY.

Sir :—The very commonest and most urgent question which the farmers ask of us is how to tell what fertilizer their land needs ; and this is the very question which cannot be answered save by getting the answer directly from the very soil and the very crop of which the knowledge is wanted. This means that the farmer must experiment and observe. How much good he may derive from this experiment will depend upon how accurate he is, and especially upon how much he knows about soils and the requirements of plants. In all our extension teaching, we have found no specific need so great amongst the grown-up farmers as the means of answering the question of how to fertilize the land. This little paper will put the diligent farmer in the way of finding out ; and it is hopefully submitted as one of the bulletins of the Experiment Station Extension, or Nixon, bill.

L. H. BAILEY.

Plan of a set of plats upon which the farmer may ask the soil and the plant what fertilizers are needed :

1	S plat.	
2	K plat.	20 lbs. muriate of potash.
3	N plat.	20 lbs. nitrate of soda, or 40 lbs. tankage or dried blood.
4	K N plat.	$\left\{ \begin{array}{l} 20 \text{ lbs. muriate of potash,} \\ 20 \text{ lbs. nitrate of soda;} \end{array} \right.$ or $\left\{ \begin{array}{l} 20 \text{ lbs. muriate of potash,} \\ 40 \text{ lbs. tankage, etc.} \end{array} \right.$
5	O plat.	No fertilizer.
6	P plat.	$\left\{ \begin{array}{l} 40 \text{ lbs. plain superphosphate with} \\ 15\% \text{ phosphoric acid.} \end{array} \right.$
7	K P Plat.	$\left\{ \begin{array}{l} 20 \text{ lbs. muriate of potash,} \\ 40 \text{ lbs. superphosphate.} \end{array} \right.$
8	N K P plat.	$\left\{ \begin{array}{l} 20 \text{ lbs. nitrate of soda,} \\ 20 \text{ lbs. muriate of potash,} \\ 40 \text{ lbs. superphosphate;} \end{array} \right.$ or $\left\{ \begin{array}{l} 40 \text{ lbs. tankage, etc.,} \\ 20 \text{ lbs. muriate of potash,} \\ 40 \text{ lbs. superphosphate.} \end{array} \right.$
9	N P plat.	$\left\{ \begin{array}{l} 20 \text{ lbs. nitrate of soda,} \\ 40 \text{ lbs. superphosphate;} \end{array} \right.$ or $\left\{ \begin{array}{l} 40 \text{ lbs. tankage, etc.,} \\ 40 \text{ lbs. superphosphate.} \end{array} \right.$

Size of plats 1-10 acre. Upon each plat the same crop is to be grown, care being taken that the seed is pure and that each plat receives exactly the same amount of seed.

(S, stable manure; K, potash; N, nitrogen; P, phosphoric acid; O, no fertilizer).

HOW TO CONDUCT FIELD EXPERIMENTS WITH FERTILIZERS.

Water and its constituents hydrogen and oxygen, and carbon, nitrogen, phosphoric acid, potash and lime are the chief components of every crop that the farmer or the horticulturist produces. If the quantity that the crop can get of any one of them is too small for the making of a good yield, the yield will not be sufficient no matter how much there may be of all the others. If the quantity of any one of them is more than enough for a good yield, it is only foolishness to supply any more of that substance in fertilizers. The supply of water and its constituents, and of carbon, are practically beyond the control of the crop-grower except in so far as water may here and there be supplied by irrigation, or may everywhere be conserved by shallow surface tillage properly managed. The supply of lime is usually large enough in ordinary arable soils. Therefore only nitrogen, phosphoric acid and potash are left to be looked after ; these, as every consumer of commercial fertilizers knows, are the things that he pays for in whatever of these fertilizers he buys.

By the introduction of leguminous plants, such as clover, vetch, lupine, peas, beans and the like, into his rotations, he may save himself from the necessity of buying so much nitrogen as he might otherwise have to get in order to preserve the proper balance of the plant-foods in his soils. These crops, as almost every farmer knows, can get a part of their nitrogen from the air ; and they will in general get more of it from the air and less from the soil the poorer the soil is in available nitrogen, and the richer it is within certain limits in potash and phosphoric acid.

Every ordinary arable soil has far more than enough of nitrogen, phosphoric acid and potash for the production of a good many crops ; and yet there are many such soils which will not yield paying crops unless fertilized with one or more of these very same plant-foods.

It may be taken for granted that an acre of every such soil contains in the uppermost twelve inches at least 5,600 lbs. of nitro-

gen, 5,000 of potash and 3,800 of phosphoric acid. These quantities are from 50 to 500 times greater than those sold off the farm in any crop. There is at least 50 times as much nitrogen in such a soil as is sold in any part of any crop, and much oftener 100 or even 200 times as much. There is at least 100 times as much potash as is carried off the farm in any part of a crop sold, and oftener 500 times as much. Similar figures might be given for phosphoric acid. Why, then, must we fertilize our soils, in one way or another?

The one most important reason is that these plant-foods in the soil are for the most part in an insoluble, or as very commonly said, unavailable form, and that they usually become available only little by little each year. That they do thus become gradually available, is clearly shown by some of the experiments of Lawes and Gilbert, of England; some of their plats have yielded crops of wheat and other cereals now for fifty years and more, without any manure.

It may be, however, that one of these foods does become available year by year in large enough quantities to contribute its share towards a good yield of some crop, provided that there is enough of the other two, but that there is in fact not enough of the other two; or it may be that enough of two of the foods will become available fast enough each season for a good crop, but that the other one will not; there will be only a poor crop in either case.

There are cases in which it would be only folly, with some thousands of pounds of the one or the two foods in the soil, and in such a condition that the crop grown on it can get all it needs for a good yield, (at least for one year, and probably for the next year, and even for a few years more), to buy these foods in commercial manure; nor would it be the height of wisdom to keep putting them on the soil year after year in stable manure, since that also contains the three foods under consideration, as well as other useful substances.

There are therefore two ways of using manures of any kind, stable or commercial. One may be called the blind and unbusiness-like way, the other the sharp and business-like way. We will consider only the second way.

The man who follows this second way, realizes that it may not be necessary to supply every crop on every soil with all three of the plant-foods mentioned above. He knows that different crops, while needing all these foods do not need the same quantities of all of them; he may suppose that this soil or that soil on his farm will yield an ample supply of one or two of these foods for as big a crop of some one kind as he wants to get, and he realizes that it may be profitable for him to find out what the real state of the case is.

The only way to get this information is the way by which pretty much all that we know about agriculture has been learned—by experiment. The crops that it is most profitable for him to raise must be fed, on the soil upon which he wants to raise them, with these three plant-foods, one by one, and with mixtures of them in the four combinations only that are possible. This is no easy road to learning; but for an intelligent farmer who has any disposition at all to study his business it will be pleasant work, and will put some variety into his otherwise too monotonous occupation.

I propose, then, to give full and simple directions for making these experiments in as reliable a manner as possible, and with the least possible expense and labor.

The selection of the field.—The field should be as uniform in character throughout as possible, and should have borne the same crop all over, at least in the preceding year, and should have been manured alike all over for that crop. If the field has been pretty well exhausted by a three or four-year rotation, more decisive results will probably be obtained than if it is in good condition. If not level or nearly so the slope should be as uniform as practicable. The underdrainage should be at least fairly efficient and uniform. The field upon which it may be most desired to make the experiment may not meet all these requirements; but it is probable that a fair approach to it can be made in most parts of this state.

The size, shape and arrangement of the plats.—The size should depend on the uniformity of the soil; for a very large field, and not fairly alike in the character of the soil and previous manuring

and cropping, larger plats would be advisable than for a smaller field of even character. The size of the plat must be determined also by the kind of crop that is to be experimented with. For a vineyard it should be larger than for corn; and for corn larger than for wheat or any similar sowed crop.

Long and narrow plats are generally considered as better than square ones, or broad and short ones. One advantage gained by long and narrow plats is that if there is unlikeness in strips across the field, all the plats can be laid out so as to run across those unlike strips; all the plats will then gain or lose alike.

The best arrangement, then, is to have plats as narrow as they can be and still carry a reasonable number of rows of the crop, and, unless the field is too large, extending from one side to the other, and across all unlike strips. Such an arrangement would reduce the labor of planting and tillage to a minimum, besides securing the probable advantage of greater evenness in results.

A set of plats seventeen and one-half feet wide would carry five rows of corn or potatoes, with three and one-half feet between the rows; there would then be three rows to harvest for the measurement of the crop, the two outside rows being rejected. For cereals, as wheat, rye, barley and oats, plats as wide as could be sown with the drill, with two or three feet vacant spaces between the plats, would answer. For small fruits, plats carrying three rows should be taken, the fruit of the inner row only being harvested for the measurement of the crop.

The fertilizers.—For *phosphoric acid* use what is called plain superphosphate. Dissolved bone black comes nearest to this of any fertilizer in the market. One responsible firm guarantees its dissolved bone black to contain sixteen to eighteen per cent of available phosphoric acid.

For *potash* use the high-grade muriate, which is always of good quality when obtained from reputable dealers. Only in exceptional cases would it be better to use the more expensive sulfate.

For *nitrogen*, wherever the fertilizer can be applied as a top dressing on the growing crop in early spring and again in early summer, use nitrate of soda, the cheapest nitrogen fertilizer on the market. But if for any reason it is impracticable to apply the nitrogen in this manner, use fine ground tankage or dried and

ground blood and meat ; the former is a little cheaper. Either of them can be mixed with the phosphate and the potash and applied at the time when the seed is put in the ground, or earlier.

The quantity of the fertilizer to be applied.—A liberal dressing will be more likely to give a decisive answer to the question put by the experiment than a scanty dressing will. I would recommend the following quantities per acre : of nitrate of soda, 400 pounds, or of tankage or dried blood used instead of nitrate of soda, 600 pounds ; of plain superphosphate, 800 pounds ; of muriate of potash, 800 pounds. The fertilizers should be dry and finely powdered, and if applied together should be first very thoroughly mixed.

The cultivation of all the plots of the same set should be as nearly alike as possible. Therefore the whole of that portion of the field selected for any one set of experiments should be plowed and otherwise prepared for fertilizing and seeding on the same day ; all the fertilizer that is to be applied and the seed should be put in on the same day. If nitrate is to be used as a top dressing it should be applied on all the plots of a set on the same day. Each cultivating or hoeing of the plots of one set should be done, and the crop of all the plots of a set should be harvested, on the same day. As soon as practicable after every rain, every plat should be surface stirred to the depth of two or three inches, in order to conserve the moisture.

All these directions being followed, differences between the yields of different plats, due to any other causes than differences in the fertilizing, will be reduced to a minimum, and the results due to differences in fertilizing will be likely to come out more clearly.

The number of plats for one complete set of experiments and the manner of fertilizing them is shown in the diagram at the beginning of this bulletin ; the size of the plat is supposed to be one-tenth of an acre. The abbreviations used are K for potash, P for phosphoric acid, N for nitrogen, O for no fertilizer, and S for stable manure, if it is desired to have a plat so fertilized in order to show whether there is profit in using any combination of commercial manures instead of the home-made product.

For the sake of economy in cost of fertilizers and labor, the

size of the plats can be reduced to one-twentieth of an acre ; if the field is fairly uniform in character, the results with smaller plats might be just as reliable as those with larger plats. Of course only half as much of each fertilizer will be required on plats half as large as those indicated in the diagram.

The growing crops should be looked over from time to time, and a record should be kept of any differences observed between the different plats, of attacks of insect pests or of fungous diseases. A record of the weather should be kept.

The harvesting of the crop.—In carrying out this part of the work, allowance must be made for the possible growth of the roots of one row into the feeding-ground of the adjoining rows ; thus the outside row of one plat may steal food from the next plat that was not intended for it ; hence the directions to exclude the two outside rows of each plat, one on one side and the other on the other side, and not to include the crop of those rows in the harvest measured, are important. Since this cannot be done conveniently with wheat and other small grains, it is recommended to leave vacant spaces of two feet between the plats.

In measuring the crop, due credit should be given for every part of it that can be utilized in any way ; if corn, not only the seed, but the stalks ; if wheat, oats, etc., the straw as well as the seed ; if potatoes, of course only the tubers.

The results.—In spite of all the care that may be taken in carrying out these soil tests, irregularities will appear in the results, sometimes so great that it is not easy to decide what their real meaning is ; weather, soil, tillage and fertilizer work together for the making of the crop on each of the plats. All the plats suffer alike in bad weather and rejoice alike in good weather ; the tillage has been the same for all the plats ; all the plats were planted on the same day ; only the fertilizing is different, because we made it so. The soil we suppose to be at least fairly uniform throughout ; if, however, it does differ seriously from end to end of the field, all our long and narrow plats run across these irregularities and should be affected alike by them.

There may, however, be differences not easy to detect in the soil of different plats, by which the growth on one plat may be specially favored, or by means of which the fertilizer may be bet-

ter utilized. Whatever the reasons may be they will tell upon the results but will make less trouble for us the more careful we are as to everything that we can control.

It is possible by a careful study of the results to correct some of the discrepancies. A few years ago a German agricultural chemist proposed a method for making such corrections by which the results could be evened up and made to show much more clearly what the soil and crop experimented upon require in the way of plant-food. The explanation of this method could not be made clear without illustrations, and such illustrations would be more interesting if drawn from actual experiments carried out in this country.

The writer of this paper will be glad to correspond with any farmers or horticulturists of this state who are disposed to try this method of field experiments, and answer any questions about the matter, go over the results obtained, apply the corrections according to the method above mentioned, and finally to issue in another bulletin early next year an account of all the experiments reported to him.

G. C. CALDWELL.



Bulletin 130.

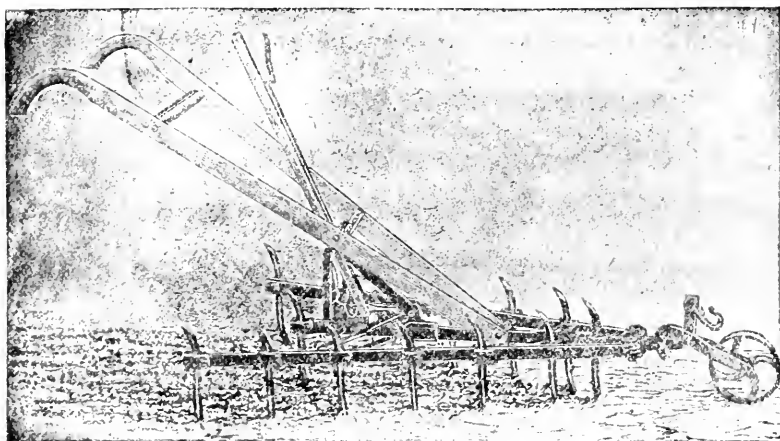
March, 1897.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

AGRICULTURAL DIVISION.

Potato Culture.



By I. P. ROBERTS and L. A. CLINTON.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
EDWARD A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk About Dahlias.
129. How to Conduct Field Experiments With Fertilizers.
130. Potato Culture.

POTATO CULTURE.

Many experiments have been conducted by different experiment stations to determine the fertilizers best adapted to potatoes, various varieties have been tested, but comparatively little work has been done to determine the possibility of making available the potential plant-food already in the soil and to determine the effects of extra good tillage upon crop production. That the average yield of potatoes in New York is far below what it should be is shown by the last United States Census Report, in which the yield is given as 68.8 bushels per acre. In 1895, a most favorable year for potatoes, the average yield for the state was about 122 bushels per acre. With a view to determine the effects of tillage upon crop production the following experiment was planned.

The land selected for the work was a gravelly soil which had been subjected to a regular four-years' rotation, consisting of wheat, clover, corn and oats. In 1894, the land was all planted to corn. This corn land was fertilized with barn manure applied during the fall and winter of 1893-4 at the rate of about 10 tons per acre. In the spring of 1895 there were measured off 46 one-twentieth acre plats, and a portion of these plats was selected as the ones upon which to conduct an experiment in potato culture.

*The land was prepared for planting as follows: All plats were plowed late in the fall of 1894 after the corn was removed. In the spring, all plats were gang-plowed about May 1st, and the ground thoroughly harrowed, marked and furrowed with a double mold board plow and planted to potatoes May 3d and 4th. It should be remembered that this ground was a loose, open soil, and that before planting it was most thoroughly fitted. No amount of after tillage can ever make reparation for the failure to fit the ground properly before planting. Fig. 33 shows the gravelly nature of the soil. The photograph was taken in the fall of 1896 after the potatoes had been harvested. This was the second time the field had been raked over and the stones removed.

*Prof. Geo. C. Watson was in immediate charge of the work in 1895.



33.—Showing the gravelly soil on which the potatoes were grown.

The record of planting for 1895 is as follows :

May 3, planted plats 21 and 22 to Rural New Yorker No. 2.

May 4, planted plats 23 and 24 to Orphan potatoes.

May 4, planted plats 25 and 26 to Rural New Yorker No. 2.

May 4, planted plats 27 and 28 to American Wonder potatoes.

The potatoes used for seed were large marketable ones and were cut to one strong eye to the piece and planted in rows $3\frac{1}{4}$ feet apart with the pieces 14 inches apart in the row. They were covered with a hoe to the depth of about four inches. The first cultivation was on May 10 with a Breed's weeder. It may be said that on this gravelly, loose soil, such an implement did good work, while on soils containing a large percentage of clay its work was not as satisfactory with us.

The second cultivation was given on May 17, when the spike-tooth harrow was used on all the plats. The importance of this early tillage before the potatoes are up can hardly be too highly estimated. The spring rains form a crust on the surface which needs to be broken up, innumerable small weeds which are just showing themselves through the soil are killed, a surface earth mulch is established which serves to prevent the loss of moisture by evaporation, and in many ways this harrowing of the ground before the potatoes show themselves is most beneficial to the success of the crop. Again on May 23, May 29 and June 6, all potato plats were cultivated with a spring-tooth cultivator. It will be noticed that up to this time the plats have been treated alike and already given as many cultivations as the potato crop ordinarily receives. From this time the tillage of the various plats, for comparison, varied in frequency. The complete record of the cultivation given is as follows :

May 3 and 4, all plats planted.

May 10, all plats cultivated with Breed's weeder.

May 17, all plats harrowed with spike-tooth harrow.

May 23, all plats cultivated with spring-tooth cultivator.

May 29, all plats cultivated with spring-tooth cultivator.

June 6, all plats cultivated with spring-tooth cultivator.

June 17, plats 21, 23, 25 and 27 cultivated.

June 24, all plats cultivated.

July 2, plats 21, 23, 25 and 27 cultivated.

July 9, all plats cultivated.

July 15, plats 21, 23, 25 and 27 cultivated.

July 23, all plats cultivated.

July 29, plats 21, 23, 25 and 27 cultivated.

August 5, all plats cultivated.

The tillage continued until the vines so covered the space between the rows that the cultivator could no longer be used without injuring the foliage.

The following table shows the results obtained from the different plats.

CULTURE EXPERIMENTS—POTATOES.

1895.	Number of cultures.	Yield per acre. Bushels.
Plat No. 21...	13	378
Plat No. 22...	9	415
Plat No. 23...	13	319
Plat No. 24...	9	414
Plat No. 25...	13	304
Plat No. 26...	9	311
Plat No. 27...	13	350
Plat No. 28...	9	330

The average from plats given thirteen cultivations was 337.5 bushels per acre. The average for nine cultivations was 367.5. As has been mentioned, this year was especially favorable for potatoes and the average for the state was extra high, being 122 bushels per acre.

In 1896, the experiment was continued. The adjoining plats selected were a part of the series which had been planted to corn in 1894 and 1895. After the corn was harvested, all plats were drilled to wheat as a cover crop. This wheat made fair growth and when plowed under in the spring added some humus to the soil. Other than this no fertilizer or manure was used, and two crops of corn had already been removed since a light application of barn manure was made. That the results might be of more value, it was decided to give to some of the plats only ordinary tillage, to other plats extra good tillage and to others excessive tillage.

The record of the preparation of the soil for the potato crop of 1896 is as follows: The plowing was done as early in the spring

as the condition of the soil would permit and the land was immediately harrowed and rolled. Before planting, the Acme harrow was used to pulverize and loosen the surface soil. Rows were laid off at distances of $3\frac{1}{4}$ feet and opened with a double mold-board plow. The seed was from selected stock and was cut so that two or three eyes were on each piece. More care was taken to have each piece of potato of good size than to have a certain number of eyes to each piece. Seed was dropped at distances of 14 inches in the row and covered with a cultivator to a depth of about 4 inches. All plats were planted May 9 and harvested October 9. The complete record of the plats will be seen in the table below.

The first tillage was given May 20, before the potatoes were up, when all plats were thoroughly harrowed with the spike-tooth harrow. The cultivation was continued until August 6, at which time the vines so covered the space between the rows that tillage could no longer be continued without producing serious injury.

RECORD OF POTATO PLATS FOR 1896.

Plat No.	Date of planting.	No. of cultivations.	Date of digging.	Yield per acre. Bushels.	REMARKS.
6	May 9	7	Oct. 9	318.2	Fertilized with 200 lbs. muriate of potash and 300 lbs. of acid phosphate.
7	"	7	"	310.5	Fertilized with 200 lbs. sulphate of potash and 300 lbs. of acid phosphate
8	"	7	"	350.3	} Comparable.
9	"	11	"	338.1	
10	"	3	"	280.	
11	"	3	"	299.7	} Comparable.
12	"	7	"	341.6	
13	"	7	"	334.	Variety test.
29	"	7	"	360.6	Fertilized with 200 lbs. of muriate of potash and 300 lbs. of acid phosphate.
30	"	7	"	333.5	Fertilized with 200 lbs. of sulphate of potash and 300 lbs. of acid phosphate.
31	"	7	"	346.5	} Comparable.
32	"	11	"	339.	
33	"	3	"	245.8	

Those marked "comparable" are to be studied for the effect of tillage only.

In addition to the cultivation which was given these plats they were sprayed four times, once with Bordeaux mixture* alone and three times with a Bordeaux and Paris Green mixture.

In addition to the series of plats, a measured acre was selected which had been in timothy and clover the previous year. The soil was a clay loam and during the winter of 1895-6 was given a light top-dressing of barn manure. In the spring the coarse material was raked off with a horse rake, and the land was fitted and planted to Rural New Yorker No. 2 potatoes. This acre received six cultivations and gave a yield of 314 bushels.

AVERAGE YIELD PER ACRE FOR 1895.

Plats receiving 13 cultivations,	. . .	337.5 bushels.
“ “ 9 “	. . .	367.5 “

AVERAGE YIELD PER ACRE FOR 1896.

Plats receiving 11 cultivations,	. . .	335.9	“
“ “ 7 “	. . .	343.1	“
“ “ 3 “	. . .	275.2	“
The one-acre field, 6 cultivations,	. . .	314.	“
Fertilized plats receiving 7 cultivations,		330.7	“
Average yield per acre for New York state			
(United States Census), 1890,	. . .	68.8	“
Average yield per acre for New York			
state, 1895,	. . . . .	122.	“
Average yield per acre for all plats and the			
one acre at Cornell University for 1895			
and 1896,	. . . . .	333.34	“

From these results we are led to conclude that in potato raising the matter of tillage is too often neglected. The results obtained two years in succession without any application of fertilizer show that the average yield of New York state is far below what it need be. The soil on which these experiments were conducted was not more rich in plant-food than the ordinary soils. The average analyses of forty-nine soils shows the following amount of potential plant-food to be contained in an acre to the depth of eight inches :†

* The Bordeaux mixture was made as follows: Copper sulphate 6 pounds, quick lime 4 pounds, water 45 gallons.

† For more extended soil analyses see Roberts' "The Fertility of the Land."

Phosphoric acid,	4,219 lbs.
Nitrogen,	3,053 "
Potash,	16,317 "

An analysis of the soil from the plats on which the potatoes were grown shows the following amounts of potential plant-food per acre to the depth of one foot :

Phosphoric acid,	3,784 lbs.
Nitrogen,	3,074 "
Potash,	12,063 "

This computed to a depth of eight inches, for comparison with the previous analysis given, shows the following amounts :

Phosphoric acid,	2,523 lbs.
Nitrogen,	2,049 "
Potash,	8,042 "

It will thus be seen that with a soil containing little more than half the amount of potential plant-food ordinarily contained in soils, a yield was secured from three to four times the average yield of the state.

The fact has been mentioned that this soil was gravelly. In securing a sample for analysis we found in the surface foot 56.79 per cent of material fine enough to pass through a sieve of 18 meshes to the inch, and 41.85 per cent of gravel which would not pass through the sieve. The loss due to drying and waste was 1.36 per cent.

In the ordinary analysis of soils the gravel is not taken into consideration and only that part is now analyzed which passes through a sieve of 50 meshes to the inch. To determine more fully what potential plant-food was in the land, it was decided to analyze the gravel, or that portion which failed to pass through a sieve of 18 meshes to the inch. The result of the analysis showed the following amounts of potential plant-food locked up in the gravel of a surface foot of one acre of the land :

Phosphoric acid,	4,008.8 lbs.
Potash,	11,329.8 "

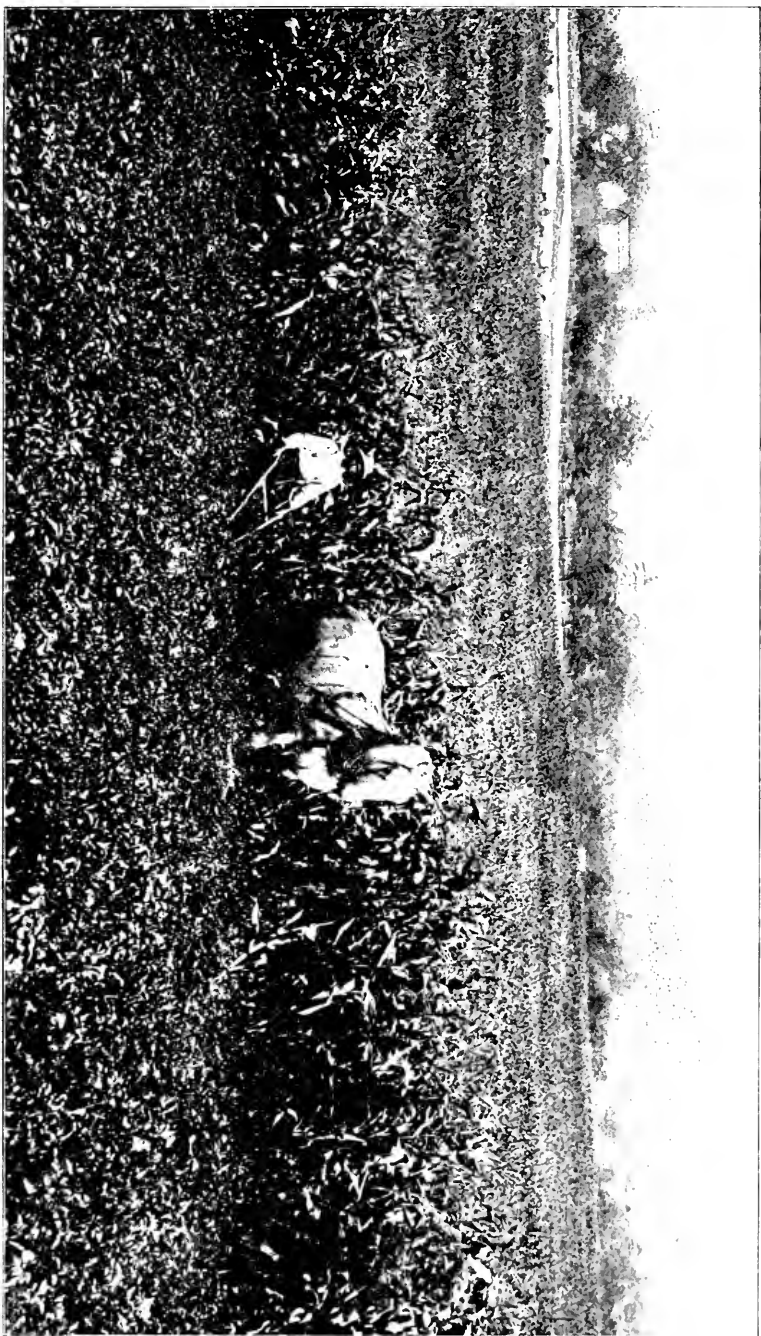
The manipulation that was necessary to cause the soil to pass through the sieve also broke down some of the gravel. It was found after sifting all the soil out that by working the remaining gravel with the hand a portion of it was so rotten that it

was easily disintegrated and fined, thus bringing into a more available condition its mineral fertilizing elements. By the frequent tillage given to the plats not only was nitrification promoted, but the mineral elements were partly liberated and made more available for the plant's use.

In a soil analyzing about one-half of the average in fertility, enough plant-food was liberated and made available by means of tillage alone to insure a vigorous plant growth. This partially explains why the application of chemical fertilizers on plats 6 and 7 and 29 and 30 failed to give any marked beneficial result. It is probable that had there been more moisture in the soil better results would have been shown from the fertilized plats, but under the existing conditions the fertilizer was applied at a loss as far as any effect was evident on the yield of potatoes. True, the fertilizers applied may be of some benefit to future crops, but the farmer can scarcely afford to purchase high-grade chemicals and apply them to his soil except for their immediate benefit to the succeeding crop, as it is well known that they become less readily available for the plant's use after having been in the soil for a considerable time. While this is true of the mineral fertilizers, it is more especially true of the nitrogenous, for if the most readily available form of nitrogen is applied, as in nitrate of soda, that portion of the nitrogen which is not made use of quickly by growing plants may be largely lost to the soil, being carried away by the drainage water.

Shall the attempt be made, not only in potato culture, but with all farm crops, to substitute fertilizers for tillage? With potatoes at 25 cents per bushel and fertilizers at \$25 per ton, is it good policy to purchase plant-food before an earnest effort has been made to utilize that vast store which nature has provided? If the effort has been made and the soil fails to respond satisfactorily, then it is not only justifiable, but it may be a wise policy to supplement the stores of the soil with additional readily available plant-food. The low average yield of the state is not so much due to lack of plant-food as to deficiency of moisture. It has been estimated by Professor King* that for

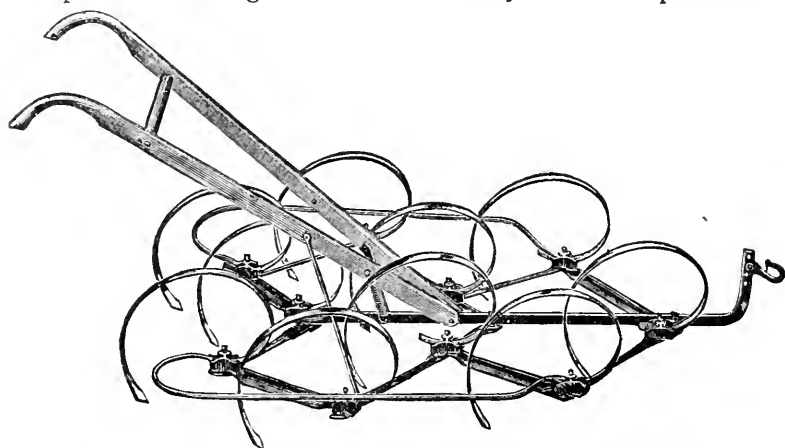
*The Soil, p. 155.



34.—Tilling to conserve moisture in potato field.

every ton of dry matter of potatoes produced there is required 422.7 tons of water. In the case of the average yield for 1896 with seven tillings when there was produced 343 bushels per acre, the amount of dry matter was 4,342.38 pounds, or 2.17 tons. To mature this amount would require some 917.25 tons of water. This was secured to the plants by early and deep plowing of the land to establish the earth mulch and to prevent loss of the spring rains, and then by frequent surface tillage the mulch was renewed to lessen the loss of moisture by evaporation.

The conservation of moisture by frequent tillage cannot be too strongly enforced. The liberal application of fertilizers, or the presence of large amounts of readily available plant-food



35.—*Cultivator well suited to potato culture during earlier period of growth.*

will prove of but little value if the moisture supply is deficient. The old notion that tillage must cease as soon as the potatoes blossom, is wrong. It should be continued as late in the season as the growth of the vines will permit. As the tops spread out and begin to cover the space between the rows, they partially shade the soil and thus lessen the loss of moisture by evaporation. The cultivator should be narrowed and the middle of the open space kept covered with a loose earth mulch (Fig. 34). The implement best adapted to this work is one having many small teeth so that it will leave the soil comparatively level. (See Frontispiece.) Fig. 35 shows an imple-

ment well adapted to potato culture during the early part of the season. The practice of cultivating potatoes once or twice and then finishing with the shovel plow, ridging the soil or hilling the potatoes, is most admirably adapted to hasten evaporation of the moisture and to produce a meagre crop, a large percentage of which is small and unmarketable.

With an abundance of plant-food and moisture for complete growth, another requisite is a healthy foliage, and to secure this requires careful attention. The earliest pest in the season of 1896 was the little flea beetles which made their appearance June 6. They work on the leaf and so puncture it that its vitality is injured and it is unable longer to properly perform its functions. A thorough spraying with Bordeaux mixture put an end to their depredations. The potato beetles made their appearance in large numbers about June 23. The second spraying was with Bordeaux mixture and Paris green, four to six ounces of Paris green to 40 gallons of the Bordeaux mixture. This was put on most thoroughly by means of a force pump. The Bordeaux mixture served to prevent early blight and the Paris green destroyed the beetles. A third spraying was given July 16, the materials used being the same as in the previous case. The late blight was almost entirely prevented and the Paris green served its purpose in keeping the beetles in check. On one plat, sprayed with the Bordeaux mixture but once, the vines died from two to three weeks earlier than on plats that had been thoroughly treated. The fourth and final spraying was given August 10th. Had this treatment not been given, increased tillage would probably have failed to produce such satisfactory results. The period of growth would have been lessened, the foliage would have been unhealthy, due to the attacks of blight and the flea beetle, and the potato beetles would have so destroyed the foliage that the manufacture of starch which goes on in the leaves in the presence of sunlight would virtually have stopped. The potatoes would have been but partially developed and inferior in quality, and instead of having only ten bushels of small ones to three hundred bushels of large ones, the percentage of small ones would probably have been greatly increased. It is the custom with some to plant their potatoes late in order to avoid the

ravages of the potato beetle, but the potato, except early varieties, in this latitude, needs the full season for its perfect development. It must be kept growing from start to finish and he who plants late to avoid the beetle is diminishing the yield very materially over what it would be were he to plant early, and then by spraying and by frequent tillage keep the plants in a healthy, growing condition until the potatoes are fully matured.

The question will arise with many potato raisers, "Will this extra care pay?" In 1895, the price for potatoes was almost unprecedentedly low, yet these, on account of fine quality and size, were sold directly from the field for 25 cents per bushel. The same thing was again true in the fall of 1896, and the average gross receipts from all plots, including the one-acre field, was more than \$80.00 per acre.

Within one mile of the University farm a man planted five acres to potatoes, and raised a total of 500 bushels, about 50 per cent of them small and unsalable, leaving a total of 250 bushels of marketable potatoes as the product of five acres. His soil was naturally more fertile than that of the University farm. The cost for plowing must have been about the same per acre, also the cost for seed and of planting and digging, and yet while his gross receipts were not more than \$15 per acre the University receipts were \$80.00 per acre. The problem for solution then is whether it is preferable to give superior tillage and care and harvest a crop of 300 bushels or more per acre or whether the potatoes shall be permitted to care largely for themselves and give a yield of from 50 to 100 bushels per acre. From these experiments and investigations in potato culture we have reached the following

CONCLUSIONS :

1. That most arable soils possess sufficient potential plant-food for a bountiful crop.
2. The average yield for the state is not more than about one-third what it should be, and what it would be were proper methods of cultivation practiced.
3. The low average in the state is due not so much to lack of potential plant-food as to the insufficient supply of moisture.

4. By frequent surface tillage, moisture may be conserved and potential plant-food made available.

5. Commercial fertilizers should be used only when the soil fails to respond satisfactorily to tillage, or to supplement manures and cover crops and stores of plant-food already in the soil.

6. Level culture is preferable to ridge or hill culture for conserving moisture. Ridges should only be used when the object is to relieve the soil of moisture as in low, damp fields.

7. All other requisites being present to insure a satisfactory crop, full success cannot be secured unless the foliage be kept **healthy** and intact.

I. P. ROBERTS.

L. A. CLINTON.

Bulletin 131.

March, 1897.

Cornell University Agricultural Experiment Station,
ITHACA, N. Y.

HORTICULTURAL DIVISION.

Notes upon Plums

FOR WESTERN NEW YORK.



By S. D. WILLARD and L. H. BAILEY.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

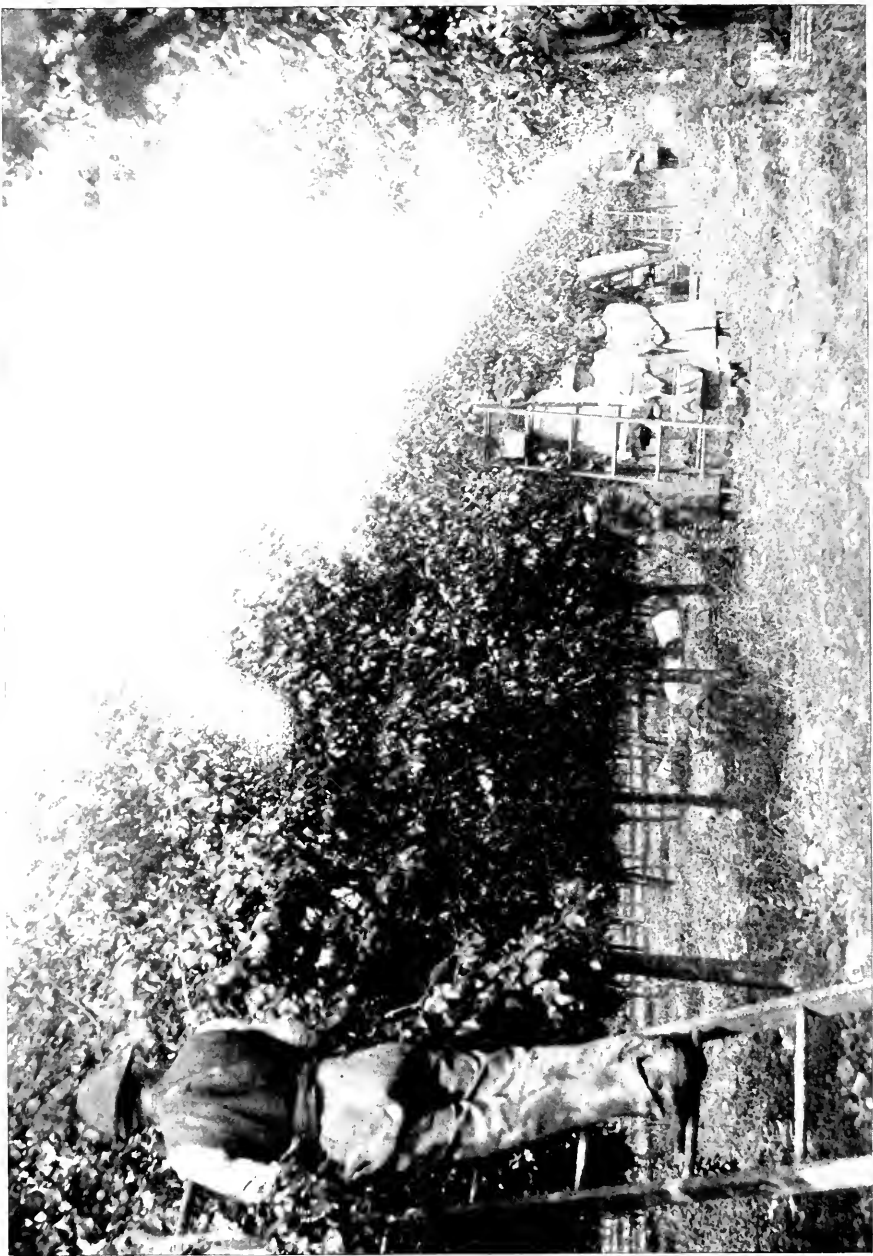
124. The Pistol-Case-Bearer in western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums.

CORNELL UNIVERSITY, Ithaca, N. Y., March 20, 1897.
HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY.

Sir :—This paper completes our survey of the stone-fruit industries of western New York, and it is submitted as a bulletin under the Experiment Station Extension Law. It is unnecessary to make any extended discussion of the methods of the tilling and fertilizing of plum orchards, for these general subjects have been fully gone over in previous bulletins upon fruit-growing. For three years the writer has been studying the plum industry of western New York, and he has also had the advantage of two or three crops upon the young orchard of the Experiment Station. The chief value of the bulletin, however, lies in the account of varieties which has been contributed by S. D. Willard, of Geneva; and Mr. Willard has also been most generous of suggestions upon plum-growing in general, and upon many other subjects, for several years. In fact, there is no one fruit-grower in the state from whom the writer has learned so much as he has from Mr. Willard; and it is therefore a satisfaction to be able to put on record some of the results of his long and profitable experience in the growing of plums for market.

L. H. BAILEY.

The pictures of plums in this bulletin are all life size, unless otherwise stated in the legend.



36.—*Reine Claude* plums, eight years old. (S. D. Willard.)

NOTES UPON PLUMS.

I. GENERAL REMARKS.

Of all the important fruits, the common plum has the smallest American literature.* The time is perhaps not yet ripe for any extended treatise upon the plum, for in a large part of the country plum growing is yet in an experimental stage. In western New York, the business is reduced to a more definite and established basis than elsewhere in the country—unless possibly upon the Pacific coast—and a few notes upon this industry may therefore serve a useful purpose until a fuller treatise shall appear.

The types of plums.—The plum industry is very complex, because so many distinct species are concerned in the genesis of the cultivated varieties. In this state, only the European or domestic plums are grown to any extent, except that the Japanese types are now attracting much attention; yet it will be worth our while to get a broad view of the subject by fixing the general basis of the plum industry in our minds. The plums cultivated in the United States belong to the following groups:—

- I. Domestica or European types, *Prunus domestica*. Native to western Asia. Comprises the common or old-time plums, such as Green Gage, Lombard, Bradshaw, Yellow Egg, Damsons, and the like. The leading plums from Lake Michigan eastward and north of the Ohio, and on the Pacific slope.
- II. The myrobalan or cherry-plum type, *Prunus cerasifera*. Native to southeastern Europe or southwestern Asia. Much used for stocks upon which to bud plums, and also the parent of a few named varieties, like Golden Cherry; and DeCaradeuc and Marianna are either off shoots of it or hybrids between it and one of the native plums. See Bulletin 38.
- III. Japanese types, *Prunus triflora*. Probably native to China. The type seems to be generally adapted to the United States, and

* The only American book I know devoted wholly to the plum is Eliphas Cope's "Practical Treatise on Plum-Growing," New Lisbon, O., 1888, 16 mo. pp. 45.

- will certainly be of great value to both the south and north. See our Bulletins 62 and 106 for full accounts of these plums.
- IV. The Apricot or Simon plum, *Prunus Simonii*. Native to China. Widely disseminated in this country, but little grown except, perhaps, in parts of California. See our Bulletin 51.
- V. The Americana types, *Prunus Americana*. The common wild plum of the north, and extending westward to the Rocky Mountains and southward to the Gulf and Texas. Admirably adapted to climates too severe for the domestica plums, as the plains and the upper Mississippi valley. See our Bulletin 38 for accounts of all the native plums.
- VI. The Wild Goose or hortulana types, *Prunus hortulana*. A mongrel type of plums, comprising such kinds as Wild Goose, Wayland, Moreman, Miner and Golden Beauty. No doubt hybrids of the last and the next.
- VII. The Chickasaw types, *Prunus angustifolia* (or *P. Chicasa*). Native to the Southern states, and there cultivated (from southern Delaware southwards) in such varieties as Newman, Caddo Chief, and Lone Star.
- VIII. The Sand plum, *Prunus Watsoni*. Native to Kansas and Nebraska. A bush-like species, little known in cultivation. A hybrid of this and the Western Sand Cherry is the Utah Hybrid Cherry. See our Bulletin 70.
- IX. The Beach plum, *Prunus maritima*. Native to the coast from New Brunswick to Virginia. In cultivation represented by the unimportant Bassett's American; also as an ornamental plant.
- X. The Pacific coast plum, *Prunus subcordata*. Native to Oregon and California. Sparingly known in cultivation, chiefly in the form known as the Sisson plum (var. *Kelloggii*).

With these ten types coming into cultivation in the rapidly enlarging fruit zones of our immense country, who can foresee what the final outcome as to types and varieties may be !*

The remarks in the present paper are meant to apply only to the domestica and Japanese plums, chiefly to the former. In

*For an historical and philosophical sketch of our plums, see Bailey, "The Survival of the Unlike," p. 418.

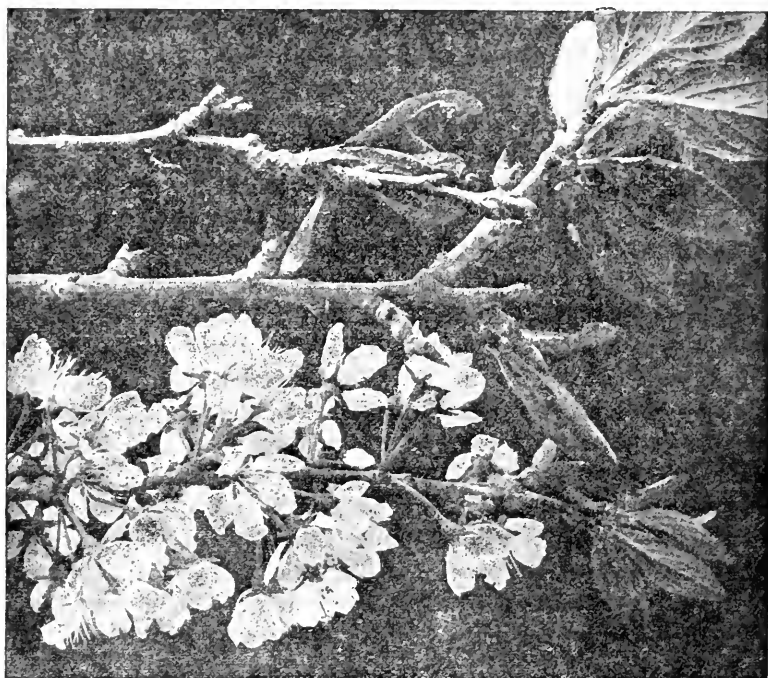
respect to varieties, it is difficult to make any classification of those of the domestica stock. Perhaps the best that could be done would be to make four loose groups, as follows :

1. Damsons comprising very small firm plums of various colors, generally borne in clusters, the leaves mostly small. The run-wild plums of old roadsides and farmyards are mostly of the damson type. (Fig. 46 and title page.)
2. The green gages, comprising various smallish, green or yellow-green plums of spherical form and mostly of high quality. Reine Claude is the commonest representative of this group in this State. There seems to be no specific Green Gage generally propagated in this country. The name has now come to represent a class of plums.
3. Large yellow plums, such as Coe's Golden Drop, Washington, and the like.
4. Large colored plums, including the various red, blue and purple varieties, like the blue prunes, Lombard, Bradshaw, Quackenboss, etc.

In respect to hardiness of the different types of plums, it may be said that at Cornell the Japanese and domestica varieties are about equally resistant to cold. Neither of them bore fruit last year, but the winter of 1895-6 was one of very unusual severity. The Americana types are very hardy. Fig. 37 shows sprigs of the three types taken at blossoming time in 1896. The upper shoot is Abundance (Japanese), the middle one Jefferson (domestica), and the lowest one Quaker (Americana). In the two first, the fruit-spurs were entirely killed. Although the Americanas are so very hardy, we do not recommend them for market cultivation in western New York because they are inferior to the domesticas and the years are very seldom in which the domesticas are injured seriously by cold.

The leading type of plum for western New York will no doubt always be the domesticas. The Japanese varieties are important because they add variety to the list, and especially because they are rich in very early kinds and the fruit is so firm that it carries well ; aside from this, the trees are vigorous and very productive, and they are less liable to the attacks of the black-knot and the shot-hole fungus than the domesticas are.

The plum orchard.—Coming now to the general question of plum growing, it may be said that the plum is emphatically a special fruit; that is, it is one which does not have a regular standing in the market as pears, apples or even peaches have, but is more or less dependent for its sale upon the general supply of other fruits. In other words, it is a fruit of secondary import-



37.—*A condition, not a theory. Showing how the winter of 1895-6 used up the fruit-spurs of Japanese and domestica plums, but did not injure the Americanas.*

ance, so far as the market is concerned. This being the case, it will readily be seen that it is not a difficult matter to overplant for the plum market. In western New York, the industry has been developed to a very important extent, but the production of fruit has probably not yet reached its zenith. Many of the orchards have been planted with no particular forethought, but

largely because some one else had done well with his plantation. It would be easy to figure up the prospective crops from the plum trees which are now growing in western New York and to see that the product would very likely over-stock the market. But it must be remembered that probably not more than half of these trees will ever produce full crops of fruit. The same remark will apply to any kind of fruit which is set in large quantities. The success of fruit-growing is so intimately connected with the thoroughness, care and business ability of the grower himself, that one can never prophesy what the results of any fruit industry are likely to be. In every fruit business there are likely to be a great many failures, from the commercial standpoint, and only a few pronounced successes.

The plum thrives upon a variety of soils, but it generally does best when planted upon clay loam. It usually thrives best upon lands which are suited to pears, or upon the heavier lands which are adapted to apples. Yet there are many varieties which thrive well upon lands which are comparatively light and sometimes almost sandy.

The stocks upon which plums are grown are very various. By far the greater number of the trees in the north are now grown upon the myrobalan stock, which is a species of rather slow-growing plum, native to southeastern Europe and southwestern Asia. This is the stock which is sometimes recommended in the older fruit books for the making of dwarf trees ; but unless the top is kept well headed in, the trees generally make normal growth upon it. Trees grown upon this root are usually larger and finer at one or two years of age than those grown upon other plum stocks, and the probability is that they are nearly as useful from the grower's standpoint as any other. However, there are some varieties which overgrow the myrobalan, and the stock is very likely to sprout from the ground and thereby cause trouble. I am convinced that the most ideal stock, from the standpoint of the grower, is the domestica plum itself, but it is more difficult to secure seeds of it, the stock is more variable and it is more likely to be injured in the nursery row by the leaf fungi ; therefore, as a matter of practice, the myrobalan has very generally supplanted it. In the southern states the peach is largely used as a stock

upon which to grow plums and it seems to be gaining favor in the north. It is undoubtedly a very excellent stock for sandy lands, and, in fact, is probably more preferable for such lands than the myrobalan itself. Some varieties—of which the Lombard and French Damson are examples—do not take well upon the peach. The Japanese plums are commonly worked upon the peach stock and they seem to make an excellent union with it and to give every promise of being hardy and durable. The Marianna stock, which is much recommended in the south, has not found great favor in New York.

Many of the varieties of plums are such slow and crooked growers in the nurseries that it is advisable to graft them or bud them upon some strong and straight stock. The Lombard is no doubt the best stock for this purpose which is now grown by nursery-men. The old Union Purple is one of the very best of stocks, but it is not grown much at the present time. All such varieties as Reine Claude, German Prune, Copper, etc., are probably best when top-worked upon some such stock.

Plum trees are usually planted when two years old from the bud, although some of the strong-growing kinds may be planted at a year old with the very best results. As a rule, plum trees are planted about as far apart as peaches are, that is, from 15 to 18 feet apart each way. Many growers prefer to plant them closer one way than the other and eventually to stop cultivation in one direction. If this system is used, they may be placed 18 or 20 feet apart one way, and from 10 to 12 feet the other way. The trees are pruned in essentially the same way that apple trees are, when planted. It is generally advisable to start tops as low as possible and yet allow of the working of the curculio catcher below them. This means that the limbs should start out from three or four feet above the ground. With the modern implements and methods of tillage, there is no inconvenience in working the land if tops are started as low as this.

The subsequent pruning of the plum tree has no special difficulties. About four or five main limbs are allowed to form the framework of the top, and in most varieties, especially those which are not very tall growers, the central trunk or leader may be allowed to remain. There is constant demand for information

as to whether young trees should be headed-in. There can be no positive answer to this question. If the trees are growing very vigorously, so that they become too tall and whip-like, it is best to head them in ; but it must be remembered that this redundant growth commonly ceases and the tree begins to spread when the bearing time arrives. If trees are making too vigorous growth, the real corrective of the difficulty is to stop the growth by withholding fertilizers or cultivation rather than by heading-in the tree. Vigorous heading-in only makes the growth the stronger. All this is a very different matter from the customary heading-in of old trees. Some growers prefer to let a plum tree take its natural open, spreading growth, whilst others desire to keep it sheared in to allow the trees to be planted closer together and to keep the fruit nearer the center of the tree. This is very largely a matter of personal preference and there are probably no very decided advantages in either system when it is carried out systematically and conscientiously. For myself, I believe that the heading-in of plum trees is practiced to too great an extent in western New York, but I should by no means be dogmatic in this opinion. It should be said that the plum tree will need pretty careful attention from year to year to keep the top in shape, to cut out and paint over all injured places and in other ways to protect the tree from accidents and from injuries of storm and insects.

In common with all fruits, the plum demands good tillage and liberal feeding if satisfactory results are to be obtained. The extended remarks upon the tilling and fertilizing of fruit lands which are made in our Bulletins 72, 102, 103, and also in 119 and 120, apply with full emphasis to the plum. Well-tilled trees should begin to bear when three years set, and, at eight and ten years of age, the prolific varieties should be bearing three bushels of first quality fruit in every good year.

Insects and diseases.—In respect to insects and diseases of the plum, it will not be necessary to say much upon this occasion. The black-knot is fully treated in our Bulletin 81. It is only necessary to say in passing that the knot is best kept in check by systematically cutting it out whenever it is seen. At all events, the grower should go over his orchard for it in the summer time

and again as soon as the leaves are off in the fall. If trees are thoroughly sprayed every year with Bordeaux mixture for the leaf-blight fungus, the black-knot will make comparatively few inroads into the orchard.

The blight which causes the leaves to fall in August or September is one of the most serious diseases of the plum orchard; but the disease can readily be kept in check by thorough spraying with Bordeaux mixture two or three times during the summer.



38.—*Fruit-rot of the plum. The upper spur is dead, probably killed by the fungus.*

We have found, at Ithaca that we can hold the leaves on until frost by sprayings which have begun about two weeks after the blossoms fall, and repeated two or three times during the season. A somewhat full account of these experiments will be found in our Bulletin 86.

The fruit-rot is another serious difficulty of the plum. This is the work of a fungus. Many times the dead and dried fruit may be seen hanging upon the tree all winter, as shown in Fig. 38; and in such cases it is very likely that the fruit-spur will be killed as the upper one in the picture has

been. In handling this disease, the first consideration is the fact that some varieties are much more susceptible to it than others are. The Lombard is one of the very worst. Again, if the fruit grows in dense clusters, the disease is more apt to be severe. The thinning of the fruit, therefore, is one of the very best preventives of the spread of the disease and at the same time, also, one of the most efficient means of increasing the size, quality and salableness of the product. It may, therefore, be expected to pay in

two directions. The specific treatment for the disease is to spray with Bordeaux mixture, applied in about the same manner as for the leaf-blight fungus. The treatment of this disease is more specifically explained in our Bulletin 86.

The recent incursion of the plum scale in western New York, which has created so much alarm, is fully treated in our Bulletin 83. This insect, although formidable, may be kept in check almost completely by thorough sprayings with strong kerosene emulsion in the winter time.

There still remains the curculio, or the insect which is the parent of the worms in the fruit. A full report upon this insect may be expected at a future time. It is enough for the present purpose to say that the mature beetle lays the eggs in the fruits when they are very small, usually beginning its work about as soon as the flowers fall. These eggs soon hatch and the little maggot bores into the fruit. Those fruits which are attacked whilst very young ordinarily fall from the tree, but those which are attacked when they are half or more grown may adhere to the tree but are wormy and gummy at the picking time. The mature beetles are sluggish in the mornings and are easily jarred from the trees. Taking advantage of this fact, the fruit grower may jar them into sheets or a large canvas hopper which is wheeled from tree to tree upon a wheelbarrow-like frame and under the apex of which is a tin can into which the insects roll. One of these hopper machines is seen in Fig. 39. There is a slit or opening in one side of the hopper which allows the tree to stand nearly in the middle of the canvas. The operator then gives the tree two or three sharp jars with a padded pole or mallet. The edges of the hopper are then quickly shaken with the hands and the insects roll down into the tin receptacle. In this receptacle there is kerosene oil, or it may be emptied from time to time. Just how long this machine is to be run in the orchard will depend entirely upon circumstances. It is advisable to use the catcher soon after the blossoms fall for the purpose of finding out how abundant the insects are. If a few insects are caught upon each tree, there is indication that there are enough of the pests to make serious trouble. If after a few days the insects seem to have disappeared,

it will not be necessary to continue the hunt. In some years, especially in those succeeding a very heavy crop, it may be necessary to run the curculio-catcher every morning for four or five weeks; but, as a rule, it will not be necessary to use it oftener than two or three times a week during that season; and sometimes the season may be shortened by one-half. The insects fall most readily when the weather is cool and it is, therefore, best to



39.—*The Geneva type of curculio-catcher.*

get through the whole orchard, if possible, before noon. Upon cloudy days, however, the insects may be caught all day. Although this may seem to be a laborious and expensive operation, it really is not so. A smart man can attend to 300 to 400 full-bearing trees in six hours, if the ground has been well rolled or firmed as it should be before the bugging operation begins. But whether the operation is troublesome or not, it is the price of plums and the grower must not expect to long succeed without it. The same treatment is essential to the saving of peaches and rarely, also, of sour cherries.

Varieties.—The most popular variety of the plum, and also one of the poorest, is the Lombard. Its redeeming merits are its great productiveness and the vigor and hardiness of the tree. The fruit is of o quality, it comes at a season when the market is full of plums and other fruits, it is very susceptible to the leaf-blight fungus and the fruit-rot, and its color is not of the best. The very fact that it is the commonest and cheapest plum would seem to indicate that it is not the best variety from which to make the greatest commercial success. I am convinced that the Lombard has been greatly overplanted; yet, I know of many orchards of it which are very successful commercially. In western New York the best markets are likely to be found for the early and late plums, and for those which have very pronounced colors, especially those which are dark red or purple. Some of the dark yellows are also very excellent for market fruits. Fruits of nondescript colors, like those which border on the ill-defined reds, the browns and the lemon yellows, are usually not profitable. There is some exception to all this in the case of the Reine Claude, which is a yellowish-green plum; but its great merit as a culinary variety and its established reputation save it from the general condemnation of plums of that class. There is also an exception in the small Damson plums which are highly esteemed in some markets, especially in Boston, for culinary purposes.

It would be impossible to give any list of varieties which would be adapted to any particular orchard. The question of varieties is very largely a personal one. Very much depends upon what ideal the grower has in his mind, and also upon his soil and location and the like. Amongst the plums which can be most confidently recommended for market in western New York are the following: Field, Bradshaw, Coe's Golden Drop, Hudson River Purple Egg, Italian Prune, Empire, Grand Duke, Arch Duke, Monarch, Gueii, Peter's Yellow Gage, Reine Claude and Copper. Amongst the Damsons, the French and the Farleigh are perhaps the best. Of the Japanese plums, the only ones which I would care to recommend for profit in western New York at present are the Red June, Abundance, Burbank and Chase. The Red June promises to be the best very early market plum for this region which I know. So far as known, the domestica and Japanese plums are self-fertile, but it is always the safest course to plant varieties in alternate rows.

II. VARIETIES OF PLUMS IN WESTERN NEW YORK.

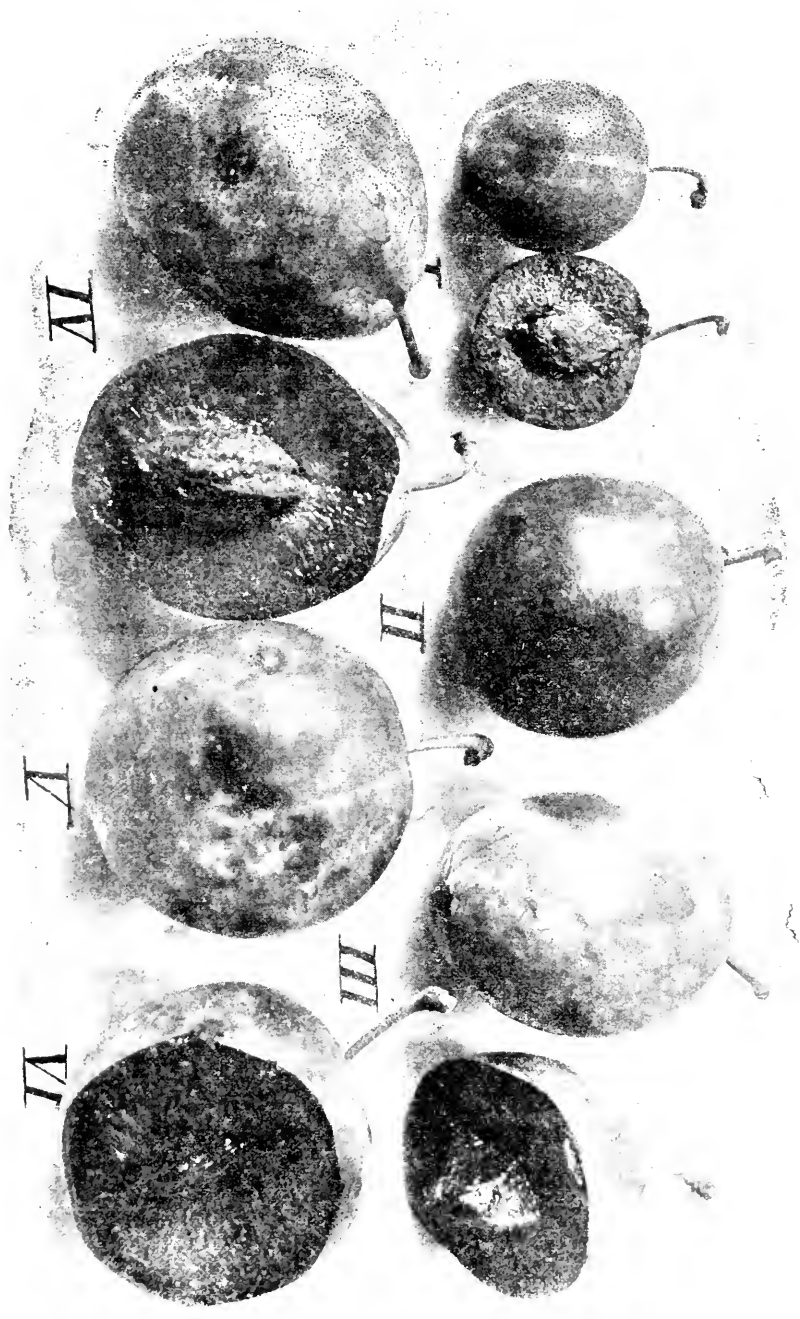
By S. D. Willard.

An experience of a quarter of a century in cultivating the plum has afforded convincing proof that, upon my soil at least, this fruit is like many others in the fact that the list of varieties adapted to profitable orchard production is limited in number. Some are tender in the wood, others defective in their foliage,* others maturing at the wrong period or possessed of other weak points that render them unfit to be grown in the commercial orchard of western New York. It will readily be seen that the result of my experience, as demonstrated in testing the various sorts of plums, has been with reference to the one idea of profit. Believing that the descriptions contained in our fruit works and nursery catalogues,—the latter being in the main copied from writings regarded as authority on these subjects,—are oftentimes misleading to the planter and are followed by ventures that are alike unsatisfactory and unprofitable, I have taken pains to make descriptions directly from life. All enjoy the delicious quality of a favorite product, but how often the question is lost sight of, as to whether it can be grown in quantity and at a price that will enable us to supply it to others at a profit over and above the cost of production!

Soil and surroundings have their influence upon the health, vigor and productiveness of a variety; hence it is frequently found that a fruit may be a failure on one soil and a success elsewhere. This feature has been very marked in the cultivation of the strawberry, and it is likewise true of the plum. Careful observation has led me to believe that any tree which has an inherent weakness, either in foliage or wood, is to be looked upon with suspicion when considered as an orchard sort for the average

* Mr. Willard prefers to grow varieties which are not subject to the leaf-blight fungus, rather than spray for the disease. He has given particular attention to the choosing of resistant varieties, and this will account for his condemnation of certain varieties which are otherwise desirable. A tree which is seriously attacked by the leaf-blight is very likely to be injured by the succeeding winter.—L. H. B.

40.—*Various types of plums. I., French Danson (two fruits); II., Quackenboss; III., Hudson River Purple Egg (two fruits); IV., Grand Duke (two fruits); V., Monarch; VI., Diamond*



planter. Being desirous of securing the largest line of varieties that might be of value, a selection was made from foreign catalogues of sorts highly commended, and these have been tested with results which, as will be seen, are not entirely satisfactory, as but few out of the entire number have made a record that would warrant their cultivation on any extended scale.

In the subjoined list, nineteen foreign varieties which I have thoroughly tested from direct importations are marked with an asterisk (*).

* *Arch Duke*.—A large, dark colored, very prolific plum, ripening about the 25th of September at Geneva and often hanging much later; flesh hard and a good shipper, hence an excellent late market variety for the orchardist and should be more largely planted. I bespeak for this variety future popularity. Originated by Thomas Rivers, Sawbridgeworth, England. See Grand Duke.

Baker Prune.—Origin, Collingwood, Canada. We obtained this variety several years since and from observing it as top-grafted in our orchard are much pleased with its habits of growth. It seems to have been grown many years where it originated and is said to be hardy and prolific. Fruit resembles the Italian Prune in color and quality, perhaps a trifle smaller and about two weeks later in ripening. Should its good characteristics be maintained upon further trial, I should regard it as the best of prunes for the commercial orchard.

* *Biltern*.—Another plum highly commended abroad for its excellence in quality and great productiveness, traits which were fully confirmed during the short period of existence of the trees after they began to make a crop, but they lacked the robust character required to maintain themselves, and, like their companions, found their way to the brush heap after setting their third crop.

Bradshaw (Niagara).—A variety now very well known in all the plum-growing regions of the United States. Unsurpassed for beauty and productiveness as well as great hardiness of tree, with a foliage so perfect as to contribute in an essential degree to its health. During the period of twenty-two years in which I have fruited this variety, I have never known it to cast its foliage prematurely; hence, the oldest trees are apparently as healthy as though they had never borne a crop of fruit. Fruit large, oval, often with a slight neck; skin reddish purple; flesh yellow, rather coarse but juicy and good; ripening from tenth to twentieth of August at Geneva. Its beauty as a market sort is unsurpassed and were its period of ripening in the month of July or past the middle of September might be regarded as one of the most desirable of all plums for the commercial orchard. It has been planted very extensively, and it is a question whether there are not enough now growing to meet the demands of the city fruit stands for years to come, as it cannot be regarded as a desirable sort for preserving purposes.

Canada Orleans.—A very productive variety of medium size obtained at Hamilton, Ontario. Skin light green to yellow shaded to light purple in the sun; quality good; ripening August 15th to 20th. Tree hardy, bearing good crops alternate years. Of no special value to the market grower.

Coe's Golden Drop.—Of English origin. Fruit large, oval or short egg-shape; skin light yellow; flesh rich and quality excellent when well ripened; requires a quick soil and favorable season to ripen it well. Tree slow, poor grower but very hardy; has produced best with me when top-worked on other strong growing sorts. In unfavorable seasons has shown inclination to rot, but it may be regarded as one of the good yellow plums. This plum, or something exceedingly like it, has been sent out on the Pacific Coast as a prune.

Coe's Late Red.—An English variety. Fruit medium size; skin light purplish red; flesh yellow; very firm and excellent for preserving or shipping; productive and late, ripening in October and frequently hanging well into November. The late John J. Thomas once said to me, if he could have only one variety of plum, this would be his choice because of its lateness and value for culinary purposes. As a tree, its growing habits are unsatisfactory, and, therefore, it will never be popular with nurserymen. It will do best top-worked on vigorous growing sorts.

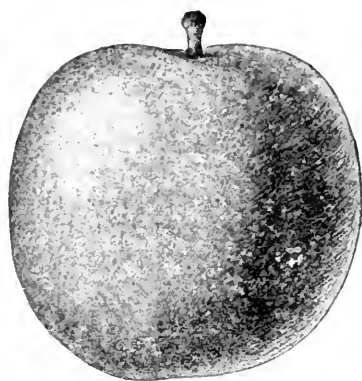
Copper (French).—A late plum, very productive and profitable, ripening last of September, frequently hanging into October; fruit medium, dark copper color and valuable for preserving. Tree a poor grower; hence, can rarely be found in hands of nurserymen. It should be worked on some strong growing sort. A fine shipper and usually sells at good prices. [Fruit globular, copper-purple with thin bloom. Valuable because of extreme lateness. —L. H. B.]

Cruger's Scarlet.—A variety that several years since was grown largely in the vicinity of Geneva. The name indicates the color, which makes it attractive when grown exposed to the sun, but the size and quality being against it both for market and family use, it has been supplanted by others of more value.

* *Curlew*.—An enormous bearer of attractive large, deep blue fruit, ripening just before the middle of August; but the foliage drops early, preventing at times a fair maturity of the crop and unfitting the tree to withstand the severity of our winters.

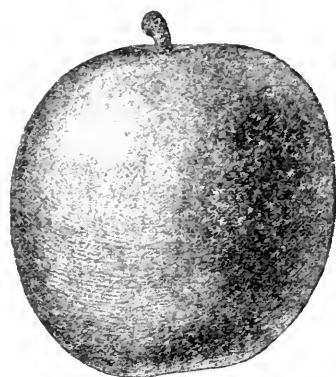
* *Czar*.—Origin, England. A large, early, purple plum, rich and good; ripening about July 25th; very productive. Defective in foliage; though fine in quality of fruit, it is of no value. Its extreme earliness would make it valuable were it more hardy.

* *Diamond* (Fig. 40, VI.).—Large, dark purple, with a beautiful bloom which renders it very attractive in appearance and sought for on the markets. Tree very productive, hardy and one of the best of English introductions, and, in my opinion, when better known, will be highly regarded as an orchard variety.



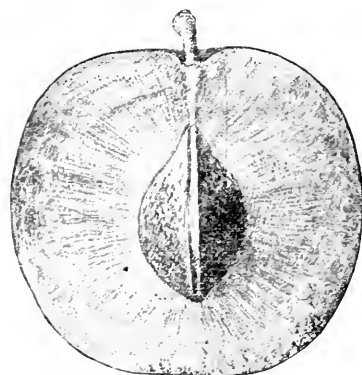
Duane's Purple.—Fruit very large, oblong; skin reddish purple; flesh yellowish, juicy and sweet, quality good; desirable for the garden or home use, but ripens with too many others to have market value, being at its best between 8th and 15th of August here. This is one of the old varieties that is rarely heard of to-day.

* *Early Rivers*.—Of English origin. Medium size, oval; purple; rich and juicy; perfect free stone; ripening last of July. Very productive, but the tree has been very tender and for this reason has been discarded, and I believe would be of no value to anyone.



Empire (Fig. 41).—Originated in Cortland county, in this state, and at one time sent out under the name of the Rood plum. Oval; color dark purple; large; quality good; tree hardy, productive and vigorous. Fruit ripening about September 5th to 10th. A variety that may become a popular orchard sort. See Shipper's Pride.

* *Farleigh Damson*.—Fruit dark purple, a little smaller than Shropshire (which see), intensely productive and one of the most hardy of all plums in bud and wood. It is valuable as an orchard tree and when better known will be in demand.



Field.—A seedling of Bradshaw; ripening ten days earlier, of same large size and color, except that it is darker and not so attractive. The fact, however, that it comes upon the market earlier adds to its value. It originated in Schoharie County, New York. It has an excellent foliage and ripens an extremely hard bone-like wood well calculated to withstand injury from severe cold. It sets a heavy crop in alternate years.

* *French Damson* (Fig. 41, I.).—One of the largest of the Damson family.

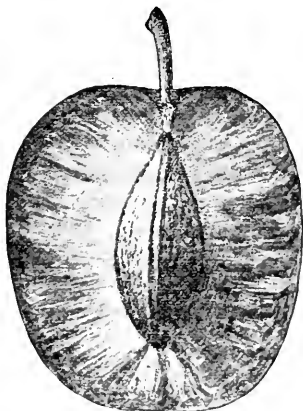
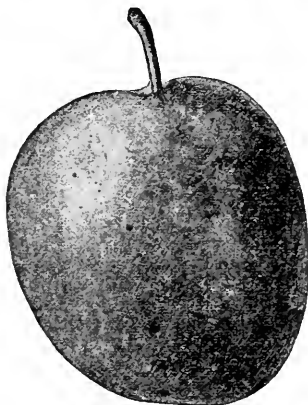
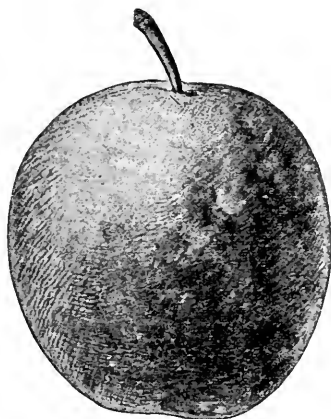
41.—*Empire plum*.

Dark copper color, ripening about September 7th, and carries a foliage so perfect as to insure complete ripening of its wood. A very valuable market variety which is but little grown.

General Hand.—Fruit large; skin deep yellow when ripe; rather coarse, and not sufficiently productive to be regarded with favor by the orchardist. It ripens early in September, but trees of large size,—fifteen to twenty years of age,—have never produced sufficient to pay for the use of the ground they occupy and have recently been grafted over to more valuable sorts.

German Prune (Fig. 43).—So many plums are in cultivation under this name that it seems difficult to fix the title. I have no less than six, all differing more or less in habit of growth, and yet the fruit deserves the name of a German Prune. These varieties have been obtained from parties in different sections, each claiming his as the best. Fruit long and oval, apt to be swollen on one side; skin purple with a fine bloom; ripens from September 1st to 12th. This prune is valuable for a marked sort or for home use and sells at outside prices. As a rule, the trees are poor growers and rarely afford satisfaction to those who desire to secure the growing habits of the Lombard in all of the plum family. See Italian Prune and Weedsport Prune.

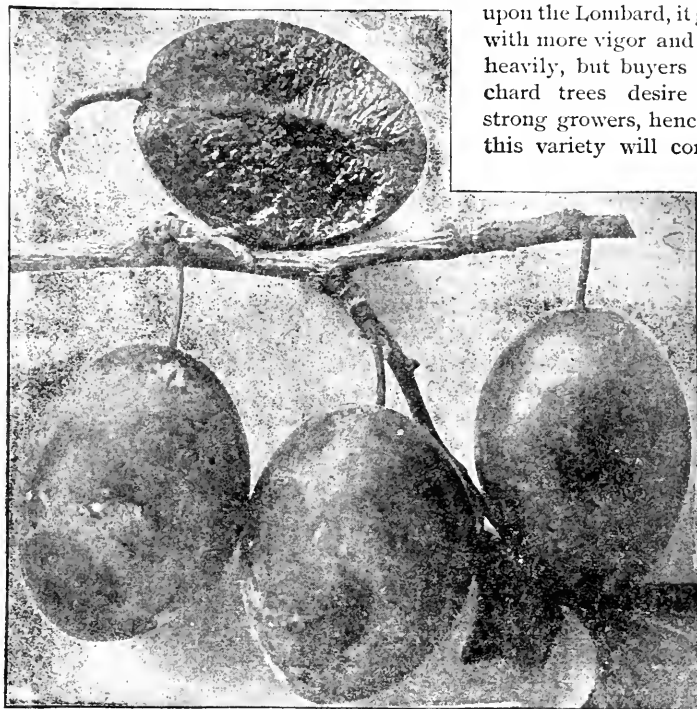
Giant Prune.—One of the new productions of Luther Burbank, of Santa Rosa, California, to whom I am indebted for the satisfaction of having fruited it from buds sent me a few years since. I have found it fully equal in size and quality to specimens grown on the Pacific Coast. It may be classed as very large, oval, dark purple plum of excellent quality. The tree, as grown top-worked upon Lombard, seems to be of good growing habit.



42.—*Shipper's Pride*.

* *Grand Duke* (Fig. 40, IV.).—Originated and sent out in England by same party that sent out Arch Duke and Monarch. Mr. Thomas Rivers has furnished to the world these three of the largest and most beautiful late plums of recent introduction. The Grand Duke is a very large purple plum, so attractive in its appearance as to be a fine market sort and apparently well adapted for general cultivation over a wide area. Unfortunately, the tree is not a strong grower and makes surface slowly on which to spread a crop of

fruit. When top-grafted upon the Lombard, it grows with more vigor and fruits heavily, but buyers of orchard trees desire only strong growers, hence this variety will come to



43.—The normal or predominant type of German Prune.

the front slowly. It ripens from Sept. 15th to 20th at Geneva, and can be classed as belonging to the late-ripening sorts.

Green Gage.—The standard of excellence in the opinion of many. Fruit round; small; skin green; flesh pale green, melting and juicy, parting freely from the stone. Tree an abundant bearer, but so dwarfish in its habits of growth that no nurseryman will attempt its propagation; hence, but little is known of it at the present day. Indeed, the variety is practically obsolete. It ripens about the middle of August. A fine sort to be found in

a list for home purposes and can be best grown by top working upon Lombard or some strong growing variety. A historic plum, of Old World origin.

Gueii.—Fruit large, oval; skin dark purple, covered with a thick bloom. Tree very hardy and productive; strong grower; quality fair, chiefly valuable for culinary purposes, ripens about August 25th, or a little too early for the market orchard. It had its origin at Lansingburg, N. Y. I had the honor of introducing this variety at Geneva, having obtained the buds at Athens, N. Y., about twenty-two years since. [Fruit pointed or conical, —L. H. B.]

* *Heron*.—Fruit large, light-purple and red; a free-stone of fine quality, ripening early in August. A good producer, but the foliage has shown a weakness that seemingly unfits it as an orchard variety for our latitude.

Hudson River Purple Egg (Fig. 40, III.).—A variety, as the name indicates, having its origin on the Hudson River. Fruit long and oval, dark purple, ripening Sept. 1 to 10; good producer only when the tree has age, and the most vigorous of all plums as a grower. It requires an annual cutting-in of the young growth to keep it within bounds until heavy fruiting checks the growth. One of the most valuable of its season as a market sort, but inclined to suffer from the depredations of the black-knot in seasons favorable for the development of the disease. Its productiveness is greatly increased by working on other sorts.

* *Ickworth Imperatrice*.—A roundish-oval, purple, medium sized, rich, juicy plum, and when well ripened most excellent for eating. Sets fruit rather scattering and will hang a long time on the tree. Rather slow grower, but very hardy. It is doubtful whether it will become a popular market sort, but holding well into October makes it desirable.

Imperial Gage.—Origin, Flushing, Long Island. Fruit medium to large, oval, green, inclined to yellow when ripe, rich and juicy, excellent in quality and of deserved popularity in a general collection; has not proved a valuable market variety with me; and as the demand for it is becoming less annually, it is fair to presume that the experience of others is the same as my own in regard to its value in the commercial orchard.

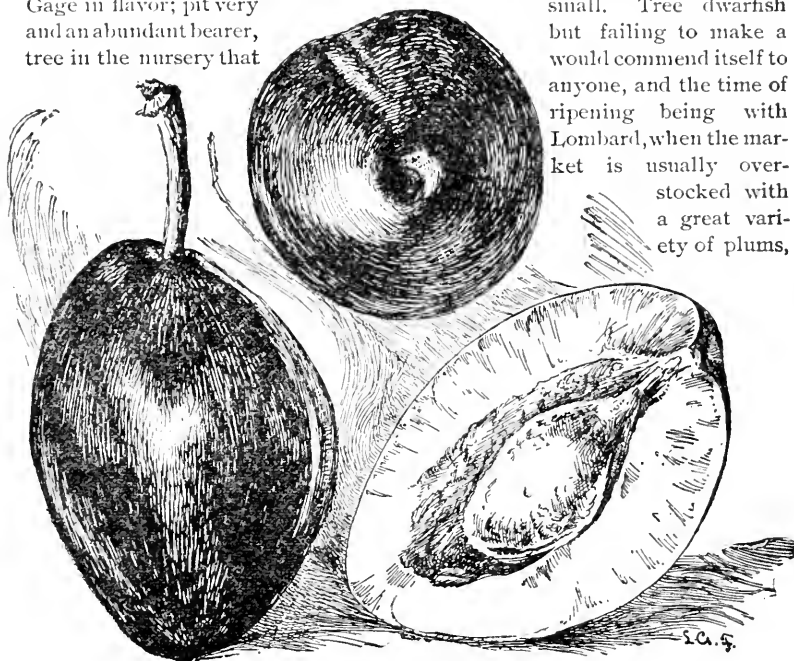
Imperial Ottoman.—A very early ripening variety of excellence, but little known. Fruit medium in size; round; skin dull yellow; flesh juicy, sweet and good. Tree hardy and very productive. Fruit ripens last of July, and should be more generally known. Ripening early, it sells readily in the markets and a few trees that we have fruited for fifteen years have been a good investment; and yet we doubt whether a single tree could be found growing in a nursery in the state.

Italian Prune, or *Fellenberg* (Fig. 44).—One of the best of the prune family. Fruit large, oval; skin dark blue with fine bloom; fine to eat from the hand or for preserving and sells at highest price in market; often hanging into late September. [Tree a round-headed grower, with well-marked foliage. Fruit long and blunt-pointed, unequal-sided, blue with a very dense bloom, a third larger than most of the strains which are grown under the

name of German Prune. In western New York it ripens in mid-September. Much prized by commercial plum growers.—L. H. B.]

Jefferson.—One of the choice table plums; large; skin yellow; excellent in quality but lacking the essentials demanded as a market sort; hence, is not in demand and will soon be unknown. Ripens a little later than Washington (which see.)

* *Late Transparent*.—Fruit large; round; greenish yellow changing to purple according to sun exposure; flesh firm and juicy, nearly equal to Green Gage in flavor; pit very small. Tree dwarfish and an abundant bearer, but failing to make a would commend itself to anyone, and the time of ripening being with Lombard, when the market is usually overstocked with a great variety of plums, tree in the nursery that



44.—*Italian Prune, or Fellenberg.*

it has been voted as being of too little value for general culture and is dropped from our list.

Lombard.—Originated in the eastern part of this state. Tree one of the most vigorous of the plum family and perhaps more generally known than any other. Skin dark red, often green in the shade. It is inclined to overproduction; hence, rarely makes a crop except in alternate years. To get best results, fruit should be thinned out one-half. Its period of ripening—middle to last of August—is such as to bring it in competition with other fruits, when it sells at low prices. Quality good when well ripened, but chiefly in demand by the canning factories as a low-priced plum.

McLaughlin.—A variety originating in Maine and disseminated by a party whose name it bears. Fruit medium to large; nearly round and flattened at both ends; skin tender, yellow and apt to be red in the sun; flesh firm, sweet and when perfectly matured excellent; ripening last of August. Tree hardy and productive. A desirable sort to be grown in a small way in a home collection, but for some reason choice fruit of this variety has met with no favor upon markets where I have placed it; hence, I cannot commend it to the commercial orchardist. Its period of ripening may be one reason of its lack of popularity. At one time I had in fruiting a large number of trees, many of which have been top-worked over to varieties of greater value. [See history and picture of this variety in *American Gardening*, May, 1893, p. 299, by Professor W. M. Munson.—L. H. B.]

* *Mallard*.—Fruit large; deep purple; flesh very rich and juicy; free-stone; tree fairly productive. Season about middle of August, but the tree lacks the vigor required to withstand our trying climate; and while it might be looked upon with favor in a collection of an amateur by reason of its quality, to the commercial orchardist it would have no value. English.

Middleburg.—A plum of recent introduction from Schoharie County, N. Y. Tree very rugged, setting a full crop in alternate years of large, fine fruit that ripens late in September, often holding well into October. Skin yellow shaded with lilac and purple. Its attractive color and late ripening make it a valuable market sort, particularly on account of its hardness. Its defect is a foliage that is inclined to drop in unfavorable seasons.

* *Monarch* (Fig. 40, V.).—Fruit very large; roundish oval; dark purplish blue; perfect free-stone. Tree robust, with a dense foliage, and an abundant bearer. In period of ripening, a little later than Grand Duke. One of the valuable English plums originated and introduced by Mr. Rivers. See Grand Duke.

Monroe Egg.—Origin, Monroe County, New York. Fruit medium size; oval; skin greenish yellow; flesh rather firm and sweet; skin rather tough, which makes it a favorite with the canners. It produces a heavy crop alternate years and ripens about with Imperial Gage, from last of August to September first. We have a few trees that have been fruiting for over twenty years but as it is not well received upon the city markets, there is no reason to commend it to the notice of fruit-growers. Years since it was in cultivation very generally by nurserymen, while to-day it can scarcely be found. Often called the Monroe.

Moore's Arctic.—A plum received from Prince Edward's Island several years since and while highly regarded there and elsewhere north by reason of its hardness, seems to have no qualities that should make it valuable to the commercial grower here. A medium size, dark colored variety, ripening last of August and in quality below the average of those that can be denominated good. We have abandoned its culture.

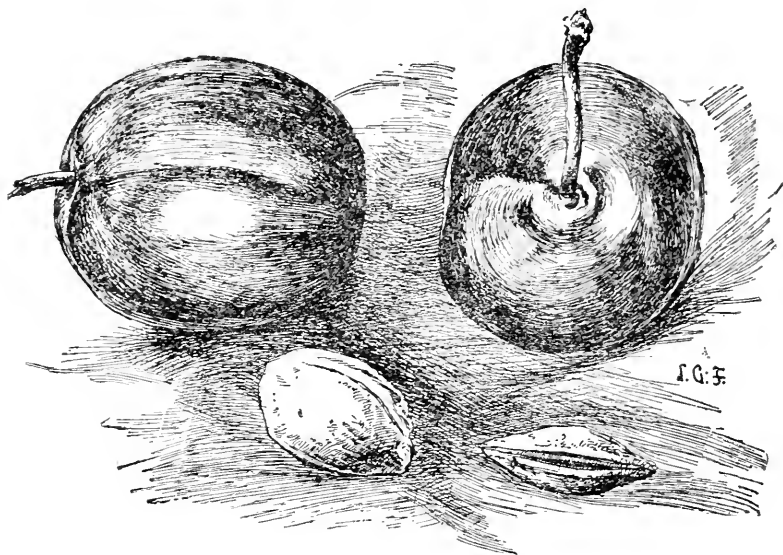
Niagara.—See Bradshaw.

Orange Prune.—A variety originating, I think, in Orange County of this State and highly commended at one time, but of no value whatever as

grown in my orchard. Trees have been grafted over. In size, color and quality an absolute failure.

Oswego.—Origin, Oswego, N. Y., and said to be a seedling, but so strongly resembling Pond's Seedling, or Fonthill, that I am inclined to regard them as identical.

Peter's Yellow Gage (Fig. 45).—Origin unknown. Fruit medium to large; nearly globular; pale yellow, sometimes little shaded red in the sun; flesh yellowish, very rich and juicy; ripening about middle of August. Tree hardy in wood and bud, an excellent variety in a family collection. An old plum of great excellence. [Fruit generally globular-oblong, with a deep suture and light bloom; color of Reine Claude.—L. H. B.]



45.—*Peter's Yellow Gage*.

**Pond*.—(Pond's Seedling, Hungarian Prune.).—Fruit oval; bright red; enormously large when well matured. Productive and tree very hardy; much inclined to rot before mature and rather inferior in quality. It cannot be denominated a favorite orchard sort in western New York.

**Prince Englebert*.—Fruit large; oval; deep purple, with a dense bloom; rich and excellent in quality; free-stone; profuse bearer. The tree is clothed with a perfect foliage and is very hardy. But little known, and at least deserving a place in every private collection. Its period of ripening about the last of August, is hardly in its favor as a very desirable market sort. Said to have originated in Belgium.

**Prince of Wales*.—Fruit round; reddish purple; medium size; ripening about Sept. 1st, and has much to commend it to general favor. Were it a

little later in maturing its crop, might become a favorite market sort. Tree very hardy ; a great bearer.

Prune D' Agen.—Fruit medium size ; oval ; excellent in quality ; skin violet-purple. Productive, but as a market sort not equal to either the Italian or German prunes and tree more indifferent as a grower. My own experience inclines me to advise top-working all prunes on strong growing sorts like Lombard, believing that the most satisfactory result will be attained to the orchardist by this method.

Prunus Simonii.—A fruit that has been sold by thousands throughout the country and for which there continues yet to be a slight demand, and yet too poor in quality to have any value whatever, and unworthy of even a description.

Quackenboss (Fig. 40, II.).—Fruit large ; rather oblong ; deep purple, covered with a fine bloom ; flesh yellow ; quality only fair, but by reason of its large size and attractive appearance sells well upon the markets. Ripens early in September. Tree very hardy, with spreading habit, slow in coming into bearing and has never been sufficiently productive on my grounds. Originated in eastern New York.

Reagles' Union Purple.—Originated near Schenectady, New York. Fruit large ; roundish ; skin red to light purple ; good quality, fine to eat from the hand, but flesh too tender for marketing and of no value for this purpose. The tree very hardy, very few plums equalling it in this respect. Have used a large number of trees in orchard for grafting other sorts upon. An old variety now rarely grown.

Reine Claude de Bayay.—Skin greenish yellow ; flesh yellow, juicy and melting. Probably the most productive and valuable of the yellow plums. Tree vigorous, but inclined to overbear, and somewhat tender. It begins to produce very early from planting and if well cared for will set an annual crop. The most enduring and reliable trees I have are those top-worked on stock of more hardy sorts. [Fruit of medium size, nearly globular, dull yellow with green shadings or markings, and a thin bloom; late. Tree is likely to be short-lived, the first evidences of failure usually showing in the dying of the bark upon the trunk. It can no doubt be improved in vigor and longevity by top-working it upon strong stocks. In the books often known as Bayay, but cultivated under the name of Reine Claude.—L. H. B.]

Richland.—Origin, Bucks County, Pa. Roundish ; skin reddish purple ; flesh yellow ; quality fair. Ripening last of August, but of no value for commercial purposes in competition with others that are so much superior to it. Tree hardy and productive. The trees we have had have been grafted over.

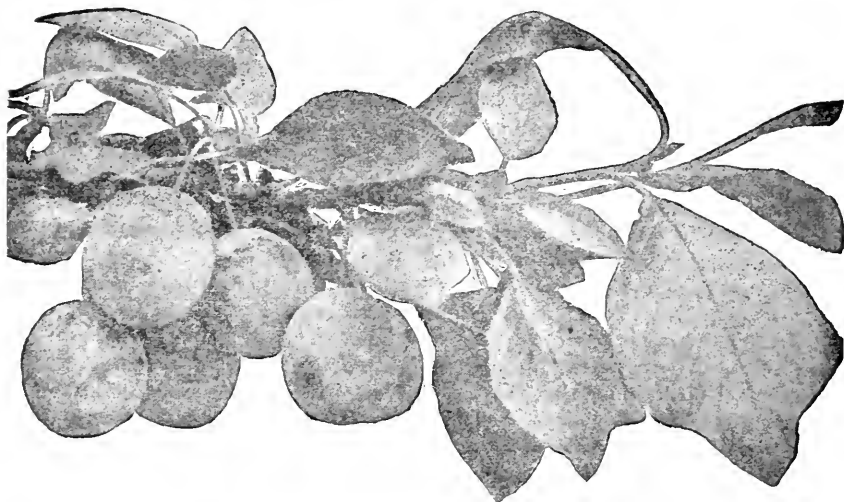
Rood.—See Empire.

Shipper's Pride (Fig. 42).—Origin, Cayuga County, New York. Fruit of fair size for shipping ; skin dark purple, inclined to be green or to ripen unevenly in the shade. Not sufficiently attractive to commend it as a market sort and ripening last of August with a multitude of others of more value.

Tree hardy, vigorous and fairly productive. We have worked over our trees to what we regard as better sorts. [Strongly resembles Empire. Shipper's Pride is the earlier by two or three days, bluer, more pointed, with a longer stem, stone wholly free whilst in Empire it is cling. Quality only fair. See Figs. 41 and 42.—L. H. B.]

* *Shropshire Damson* (Fig. 46).—Dark purple; rather obovate, a little larger than ordinary Blue Damson; very productive. It ripens from last of August to early in September and can be profitably grown in the orchard. Like many others of the English sort, however, it is inclined to drop its foliage early.

Smith's Orleans.—Largely grown twenty-five years since and then regarded as a valuable sort for the family garden, but its period of ripening,—little past middle of August,—has rendered it unpopular in the commercial orchard list, hence it is but rarely found in the nurseries of to-day.



46.—*Shropshire Damson*. Two-thirds full size.

Fruit large; flesh yellow, juicy and rich; skin reddish purple; excellent for eating.

Spaulding.—Medium size; yellowish green; quality fair. Moderately productive and ripening a little earlier than Reine Claude. Has nothing of especial value to commend it to the commercial orchardist. This variety was put upon the market as curculio-proof, which, of course, it is not.

Stanton.—Origin, Albany Co., New York. Fruit medium size; nearly round; excellent in quality either for eating from the hand or preserving. Ripening middle of September, often later, and having the property of keeping well after being picked. It is an excellent shipper, but unless picked before too mature is inclined to drop from the tree. It is a little

tardy in coming into bearing, but can be regarded as a desirable orchard variety.

Union Purple.—See Reagles' Union Purple.

**Victoria*.—Fruit large; oval; reddish upon a yellow ground. An abundant bearer, but foliage very defective, frequently leaving the tree with a mass of unripened fruit, which, in a warm, moist season, is apt to decay badly. With me this variety has been a complete failure.

Warner's Late Red.—A late, small, red plum sent to me several years since from Schoharie County, N. Y. Tree very hardy and prolific, but fruit lacking in such essentials as would be regarded desirable either for home use or market.



47.—*Weedsport Prune*.

Washington.—One of the largest of all plums, of fine quality, skin yellow; has an excellent foliage. Fruit ripens middle to last of August at Geneva. Tree vigorous and hardy, desirable in a family collection, but can hardly be said to have value as a market fruit.

Weedsport Prune (Fig. 47).—One of the many German prunes, the tree of which is so poor a grower that it will be grown by few in the nursery, and the fruit differs little from several other strains. Much esteemed about Weedsport, N. Y.

Yellow Egg.—A variety that has been disseminated under several other names, but more frequently called for as Magnum Bonum. Very popular because of its beauty and size and value for canning purposes. Skin yellow with a bloom and a deep golden color when fully mature. The tree is on

of the most hardy of the plum family and where this is an essential, it should be more generally planted, provided the soil is inclined to be heavy. On some of the light soils of Michigan we have known of its dropping the fruit badly before mature. Its large size and fine qualities for canning make a demand for this purpose among those engaged in this industry which would warrant its cultivation more largely. It ripens about the middle of August, is of low quality and in no sense a desirable fruit to eat from the hand.

Yellow Gage is a general name for a class of yellow plums, of which *Peter's Yellow Gage* is the best for western New York.

Japanese Plums.

Abundance.—A variety of the Japanese plum which I have now been fruiting for eight or nine years. I regard it as one of the best of several of the family that I have tested and so well known as to need no description. Quality good and productive; tree hardy and vigorous, but in no sense equal in my estimation to the next.

Burbank.—A variety sent out by Mr. Luther Burbank, of Santa Rosa, California, and well described in Bulletin 106 of the Cornell Experiment Station. The tree is very hardy and vigorous, but the most sprawling in its habits of growth of any plum I have ever cultivated. As regards productiveness, it is unequaled by any plum I have ever fruited. To produce the finest fruit heavy thinning should be practiced. The quality is excellent and it is destined to become one of the most popular of all plums for canning, while its attractive color, good quality and shipping properties will cause it to be sought for as a market variety. It ripens ten days to two weeks later than *Abundance*. I have had it in fine condition the last week in August and early in September.

Kelsey.—This variety has winter-killed to such an extent that I abandoned any effort to fruit it and am sure if the variety obtained was true to name that it cannot be grown as an orchard tree at this place. [We still hear of the *Kelsey* being fruited in New York, but in every case which we have investigated some other Japanese variety has been misnamed the *Kelsey*. The farthest north which I have ever known the true *Kelsey* to fruit is southern Delaware.—L. H. B.]

Ogon.—Medium to large; color lemon yellow; flesh firm and a good shipper; perfect free-stone; quality poor; inclined to drop badly before mature, and is only a fair producer. I see no reason why it should be planted in the commercial orchard, but is a good canner. Have had it in fruit for several years.

True Sweet Botan.—Received from J. C. Normand, of Marksville, Louisiana. It closely resembles the *Abundance* in wood and fruit, and yet it seems inclined to ripen a few days earlier; of better quality and apt to take on a brighter red color; hardy and productive.

Willard.—This variety, with several others, was obtained in a lot of cions obtained in California several years since and in which I became specially

interested because of its vigorous habit and hardness. Size medium; color red and attractive; productive; very early; frequently ripening by 15th to 20th of July, and when picked early will keep a long time in good condition with no disposition to decay. Quality poor; indeed, as compared with others, I regard it as inferior.

Yellow Japan.—This variety was obtained of Mr. Normand, and I understand has also been disseminated under the name of the Chase. Fruit not quite equal to Burbank in point of size as grown in close proximity on my grounds. Color of skin not quite so dark. Quality good, habit of growth upright, foliage not so strong and in my opinion the tree might not endure as low a temperature without injury as the Burbank. It ripens considerably later and is more variable in its habits. The fruit has been much larger and of better quality and color some seasons than others, upon the same trees; hence, I have been led to infer that it is scarcely as reliable as Burbank. [This is the Chase of my Bulletin 106, and that name should be preferred.—L. H. B.].

The following is a list of others of the Japan family, growing for test purposes, some of which have borne a little fruit, but not sufficient to warrant an expression as to their merits: Satsuma, Berger, Wickson, Red June, Normand, Shiro Smomo, October Purple. The last received from Luther Burbank from whom also sample fruit was had, which was fine in appearance and of excellent quality, and should this variety develop quality and productiveness of a satisfactory nature here, I believe it will be valuable.

Bulletin 132.

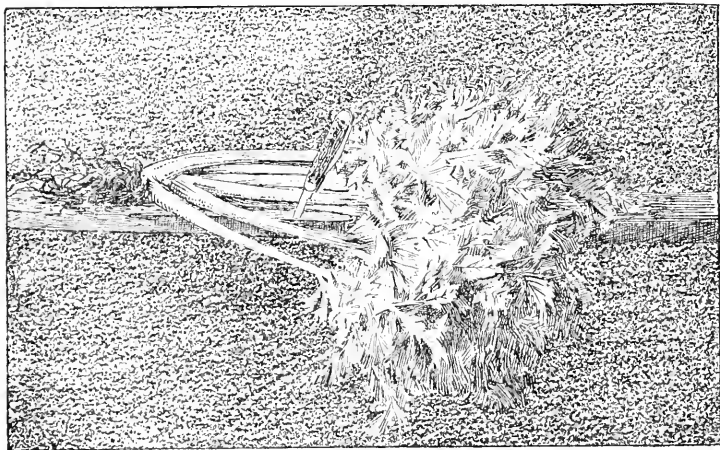
March, 1897.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

Botanical and Horticultural Divisions.

NOTES UPON CELERY.



By B. M. DUGGAR and L. H. BAILEY.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
EDWARD A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk About Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums for western New York.
132. Notes upon Celery.

CORNELL UNIVERSITY, ITHACA, N. Y., March 30, 1897.
HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY.

Sir : The things which celery growers in western New York chiefly want to know is what to do for blight and how to fertilize the land. We have tried to find out. The attempt is submitted for publication under Chapter 437 of the laws of 1896.

L. H. BAILEY.

CONTENTS.

I. TWO DESTRUCTIVE CELERY BLIGHTS (*By B. M. Duggar*).

Introductory.

A. EARLY BLIGHT.

General Discussion.

Remedies.

Artificial Cultures of the Fungus.

B. LATE BLIGHT.

General Discussion.

Late Blight in the Storage House.

Remedies.

Special Characters of the Fungus, and Artificial Cultures.

C. REMARKS ABOUT THE CONSTRUCTION OF STORAGE HOUSES.

D. BIBLIOGRAPHY OF THE CELERY BLIGHTS.

II. EXPERIMENTS WITH FERTILIZERS ON CELERY (*By L. H. Bailey*).



56.—Interior view of old-style storage house, shown in Fig. 54. Celery mostly removed.

NOTES UPON CELERY.

I. TWO DESTRUCTIVE CELERY BLIGHTS.

** Introductory.*

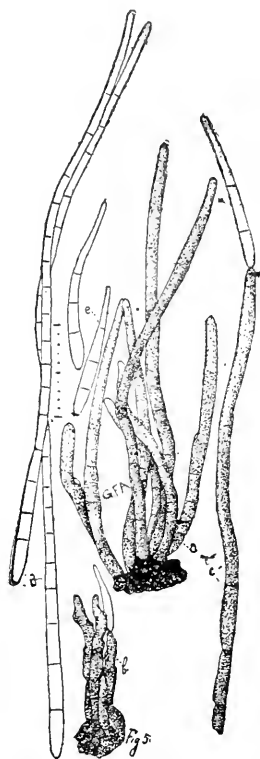
The celery industry in New York has attained a rapid development during the past ten or twelve years. It was only a few years earlier that this plant became so extensively cultivated in the favorable region about Kalamazoo, Mich. At the latter place the conditions are such as to form an environment peculiarly salubrious for celery, and the disease question appears not to have forced itself so prominently upon the attention of growers. In other widespread areas, celery is subject to several blights and spots which greatly affect the marketable value of the product. In the growth of this plant there is no little expenditure of labor, and any cause operating to reduce the price of each heart a few cents means the obliteration of the profits of the grower. There is no doubt that with favorable conditions and skillful management celery is a paying crop, but two fungous diseases, especially prevalent during the past season, threaten the profits of many. Practically, work upon these diseases has just begun, and if at the outset there is given simply a clear exposition of what these diseases are, and their effects upon the plant, it is hoped to secure the coöperation of those interested; and, in future, work will be undertaken toward definite measures of relief. In this bulletin a general knowledge of the subject will be summarized, and special attention is called to the matter of storage cellars and to the disease last season so prevalent therein.

A. EARLY BLIGHT OF CELERY.

General Discussion.

During the latter part of July of the past season, L. A. Clinton called my attention to the destructive effect of a celery disease on the truck lands of R. W. Parr, Ithaca. The plants then badly

affected were in an advanced state of growth. Many of the lower leaves were brown and wilted, while the disease seemed to spread rapidly to the younger leaves as they unfolded in freshness and vigor. The spots on the vigorous blades were characteristic of the disease popularly known as "celery blight," and a micro-



48.—Microscopic characters of the early blight.

scopic examination confirmed this, showing the causal fungus to be *Cercospora Apii*. This is one of the first celery diseases to make its appearance either in the seed-bed or in the field. It is a well known pest in Europe, and in this country it seems to have received spasmodic attention for nearly fifteen years. Beginning on the outermost green leaves, it appears in spots more or less circular, grayish-green at first, and becoming brown and ashen. In the early stages of the disease there is a well defined spot with slightly raised border; but when the spots become numerous on a leaf, the latter begins to turn yellow, and subsequently the fungus develops abundantly its fruiting growth in indefinite areas, thus giving the characteristic ashen spots of indiscriminate form. The filamentous vegetative organs of this fungus, like most parasitic fungi, grow within the tissues of the leaf, and soon minute fertile filaments, or hyphæ, are protruded in slight fascicles through the pores, or stomates, of the leaf. These fertile hyphæ (or fruiting filaments) as seen under the microscope are illustrated in Figure 48, *a*, *b*, and *c**; and

here it is also seen that these hyphæ bear hyaline reproductive bodies, the spores, or conidia, *e* and *d*. Falling upon other leaves with suitable moisture, these conidia germinate by the protrusion of delicate thread-like tubes, and these tubes effect an entrance

*This figure was drawn by Professor Geo. F. Atkinson, and used by him in Bulletin 49 of this Station.

through the epidermis of the leaf to the tissues within, where they spread and again cause the death of the affected parts, and consequently the characteristic spots. Each hypha bears more than a single conidium, and the scars or knees shown in the figure are the points at which successive conidia were borne. The conidia retain their vitality for some time, and it is feared that they may be able quite generally to pass the winter without injury.

Considerable confusion exists regarding the nature of the season during which this disease is most prevalent. It has been reported most abundant during the hot, dry periods, and also most injurious during the warm "muggy" days.* In my own experience heat is an important factor, but moisture does not necessarily give the celery plant the mastery. In hot dry weather the vigor of the plant is reduced; and, with heavy dews at night, the action of the fungus is marked, especially on the lower leaves. With a wet soil and muggy days I have noted a rapid spread of the fungus, and it is then that the disease will spread over large areas of wilted or affected leaves. In a report† of the Division of Vegetable Pathology, it is stated that shade is of great importance; that where the soil is cool and moist, and the air humid, as at Kalamazoo, Mich., the disease is said to be unknown. In this connection the only observations I was able to make were upon small areas in well drained, shaded, garden lots; and in such locations the fungus was not abundant. This disease disappears with the cool nights of autumn, and it may be followed by the other blight discussed in this bulletin. Because this celery disease does not usually appear late in the season, and in order to distinguish it from others, I have spoken of it as the early blight of celery.

Remedies.

The use of fungicides for the prevention of the early blight has been attempted with varying success, but there is still lacking much definite information about the use of these materials which will necessitate some extended experiments during the ensuing season.

* Report U. S. Dept. Agriculture, 1886, p. 117.

† Report U. S. Dept. Agriculture, 1888, p. 398.

Salt, lime, hyposulfite of soda, potassium sulfide, etc., have been used unsuccessfully.

Experiments conducted by the Division of Vegetable Pathology at Washington indicate that shading the plants by means of screens is most effective ; but this seems wholly impracticable.

The most pronounced results thus far with fungicides are in favor of the ammoniacal copper carbonate solution, although in one region sulfur has seemed more successful. At the New Jersey Experiment Station in 1891, Halsted found that the yield of marketable celery from a row treated with the copper compound was nearly double that of an untreated adjacent row ; and, moreover, application of the fungicide was not made until the celery was already badly blighted. At the Connecticut (New Haven) Experiment Station, Sturgis recommends the use of dry sulfur at the rate of 2 lbs. for 1,200 plants.

It is necessary to add a few experiments made in Ithaca during the past season, in the field where the early blight was first observed. As before mentioned, most of this celery was in an advanced stage of growth, and badly diseased ; but it was thought that if the fungus could be checked until lifting time, much good might result, and at least a practical demonstration of the use of fungicides for celery would have been made for the Ithaca growers. Sulfur at the rate of 1 lb. to 1,000 plants and a standard solution* of ammoniacal copper carbonate were used. An application of one of these fungicides was made to each of two plats of celery, and a larger plat untreated reserved as check, the treatment being given on July 28, an exceedingly hot day. The following week there were alternate rains and scorching suns, and at the end of this time the plants sprayed with copper carbonate appeared slightly scalded. There was then hot, dry weather for a week or more, and on August 15 there was marked improvement in the rows sprayed with the copper compound,—so much so that it might be detected at some distance. The rows dusted with sulfur showed some improvement, but less than the sprayed plat. On

* A formula often used is as follows :

Copper carbonate	8 ozs.
Ammonia water (26°).....	3 pints.
Water.....	45 gals.

August 15 a second application was made as before, except that a weaker solution* of the copper carbonate was used. A heavy rain followed in a short time, and little result could be anticipated from this application. I was then necessarily absent from Ithaca for a month, and further applications were not made. Thus the work was left in rather indefinite shape to await earlier experimentation another season. The results at least suggest that carbonate of copper may be used to advantage. At the time of setting, young plants (leaves only) might be dipped in a weak solution of this fungicide, and subsequently the growing plants sprayed at intervals of two weeks with a solution of the same strength. Any of the spraying apparatus used for potatoes would suffice for this work. Growers should be extremely careful not to set plants which are in any way spotted in the seed bed; and if the sets are purchased, use none in a lot showing any indication of the disease.

The fact that the spores of the fungus have been found to germinate after passing the winter on the dead leaves† of the previous season will suggest to progressive growers the need of destroying all refuse matter and diseased material. Bits of diseased material will remain, however, and this alone indicates that rotation is a good thing where it is practicable. Again, the fungus spreads rapidly upon wilted plants, especially in muggy weather, so that care should be taken to collect and destroy the product of suckering. A disease of the common wild parsnip so closely resembles this celery blight that many botanists consider them forms of the same disease; so it may be well to rid the borders and fence rows of the wild parsnips.

Artificial Cultures of the Fungus.

The length of the fruiting hyphae and conidia are largely dependent upon the amount of moisture in which they are developed, and probably somewhat inversely upon the vigor of the leaf. On leaves placed in a moist chamber the condition is much as represented in Figure 48, *c* and *d* (pro-

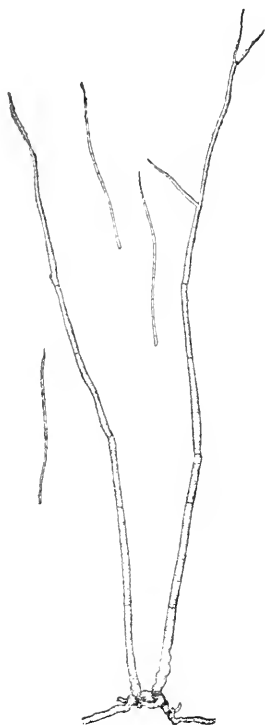
* This formula consisted of

Copper carbonate.....	6 ozs.
Ammonia water (26°).....	2 pints.
Water	45 gals.

† Report U. S. Dept. Agriculture, 1888, p. 399.

duced on wilted leaves in a wet season) ; while *b* and *c* show the same fungus under normal conditions. I have experienced no difficulty in germinating the fungus on plates of agar, and in securing pure cultures in tubes of sterile bean stems or of petioles of celery. In this condition the fruiting hyphae are often ultimately more than a millimeter in length. At first conidia are regularly produced, leaving the accustomed geniculations ; and these conidia vary in length from some exceedingly short to others measuring 250 μ .

After the hyphae have attained considerable length no further conidia are produced ; and, instead, the spore-like branches which arise remain attached, and appear as true branches of fertile hyphae. Figure 49 (Leitz ocular 1, objective 4) illustrates the character of growth on bean stems. I neglected to make a photograph of a good petri-dish isolation culture until it was badly contaminated with bacteria ; but Fig. 50 serves to show the nature of the growth on agar. The colonies are large, circular, at first olivaceous, and not readily separable from the agar. Later a grayish-white aërial growth of cottony mycelium appears, interspersed with which are the long fruiting hyphae. In general, growth in artificial cultures is characteristic, both on agar and on bean stems, differing materially from that of half a dozen *Cercosporæ* cultivated during the past summer. No perfect stage of this fungus has been secured ; but every effort is being made to ascertain if there is an intervening perfect form. As yet, I have not been able to secure cultures of *Cercosporæ* on hosts closely related to the celery.



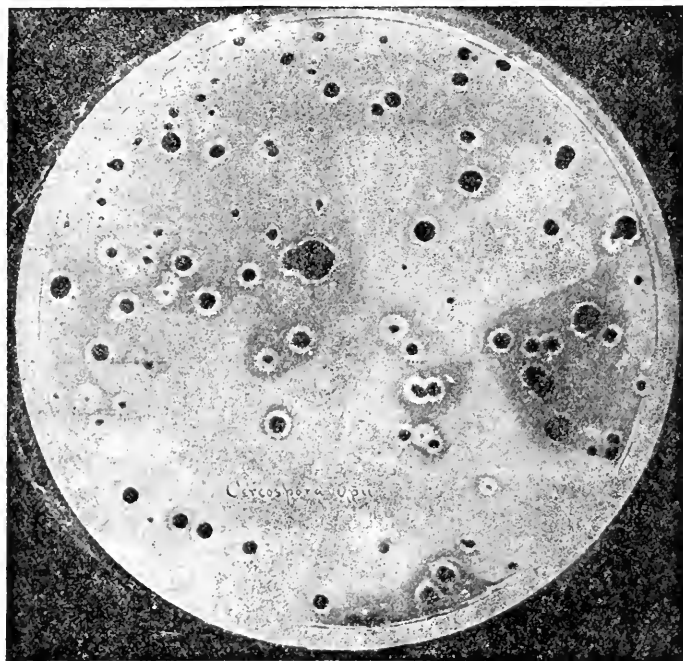
49.—Hyphae of the *Cercospora*, when grown on bean stems.

B. LATE BLIGHT OF CELERY.

General Discussion.

At the same time that the early blight was abundant on the Ithaca flats, a different disease was found in a garden not far distant. The latter disease had then appeared on a few leaves only. In general appearance it might easily have been mistaken for the early blight, although it is distinguished from the latter by more irregular spots, which are of a tawny color. Under a hand lens, minute, black, fruit bodies, or pycnidia, could be seen on either

side of the leaf; and the operative fungus was found to be one called *Septoria Petroselini*, Var. *Apii*. The form on celery is a disease which has been known to mycologists in this country only about six years, and with favorable conditions for its spread, it has proved to be a most destructive celery disease. In the garden mentioned this fungus did not spread rapidly during the



50.—Growth of the *Cercospora* in agar.

summer, and it was not until early autumn that much harm seemed to have resulted from its action. With a slight attack the irregular spots are well defined; but with conditions more favorable for the disease the fungus may spread rapidly to the whole surface of the leaflets (illustrated in Figure 51), and even to the petioles, causing a complete wilting of affected leaves. The minute, black, fruit bodies, or pycnidia, are then abundant on

all parts of the leaf, and by careful observation they may be seen with the naked eye.

A section of a leaf through one of these minute pycnidia is shown in Figure 52. At *a* is shown a cross section of the more or less spherical fruit body. It is deeply immersed in the tissues of the leaf, and the walls are stout and appressed. From these walls arise a forest-like mass of minute filaments, or basidia,

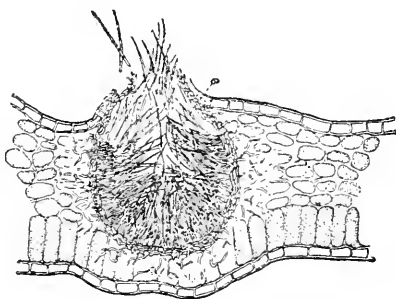


51—Spots of late blight on a celery leaf.

bearing the needle-shaped spores, or reproductive bodies of the fungus. When ripe, these spores are doubtless expelled through the mouth of the pycnidium by means of absorbed water, and then they are readily scattered by wind and rain for the immediate dissemination of the fungus. The spores readily germinate, giving rise to the delicate tube-like filaments, which enter the tissues of the leaf as mentioned for the *Cercospora*.

The disease is active in the field until the last plants are lifted ; and, as mentioned before, I have found it following the early blight during the cooler weather. However, as will be seen later, the late blight does not confine its ravages to the field, but extends its destructive action to the storage coop, or cellar, and as the disease has already been termed a blight, it seems well to speak of it as the "late blight." There is already another fungus called the "leaf-spot of celery."

From later observations it seems that the late blight was the most injurious celery fungus during the past season, but it was not so destructive at Ithaca. Few experiments have as yet been made with the use of fungicides upon it, but it has been recommended by the New York (State) Station at Geneva to spray young plants with Bordeaux mixture. With older plants it would be better to use the ammoniacal copper carbonate, or it may prove as well to use the latter throughout. The same caution relative to the use of healthy seedlings will apply as for the early blight, and in this case it is especially necessary to begin early. Further remedial suggestions will be made later.



52.—Section of a pycnidium, or fruit-body, of the late blight.

Late Blight in the Storage House.

It is to be remembered that the late blight may yet be active when the last lot of celery is transferred to the coop, or root house, as these storage cellars are variously termed. This brings us to an important feature of the celery disease question, and one which, apparently, has hitherto received no attention. Again my attention was first called to this matter on the premises of R. W. Parr, Ithaca, by an examination made late in December of celery stored both in a cellar and in a root house. In the cellar where the trouble was greatest, the temperature was manifestly higher than might be desired. The first effect of the disease is quite the same

as that seen in the garden in severe cases. The outer green leaves are the first to wilt, and on these the black dots, representing the fruiting bodies of the fungus, are scattered indiscriminately.



53.—*Celery plant, from a cellar, affected with late blight.*

Soon the fungus spreads to the younger and blanching central leaves, wilting and discoloring these wherever a foothold is secured. Fig. 53 is a photograph of a diseased plant from this cellar, showing the wilted and blackened appearance of the leaves. The plant was so much wilted that the photograph was necessarily taken by suspending the plant top downward. In the root house the temperature was evidently much lower than in the cellar, but even in the former the disease was destructive. As far as marketable plants were concerned, the whole stored product was greatly reduced, and I could see no hope of profit on the necessary outlay.

As the late blight was proving so destructive in Ithaca, where celery is grown on a small scale only, it was thought well to visit some other truck regions of the state where celery gardens are more abundant. Accordingly, early in January a visit was made to South Lima and Irondequoit with the hope of securing, even

at this late date, additional and valuable data relative to the injuries from this disease in the storage cellar.

On making a survey of the root houses at South Lima, I found the amount of loss sustained from the late blight far greater than

had been anticipated. A large portion of the stored product had been marketed early on account of the prevalence of the disease ; and of the celery remaining in the coops at this season, it seems to me a fair estimate to say that not more than one-third of it was salable. The celery growers of this place reported that they were not familiar with the blight in previous years, and during the past season it first came to their attention during September, when the plants were lifted for storage. At this time the leaves were somewhat spotted by the disease. This was evident on examining the older and formerly green leaves of the stored product ; for the tell-tale spots, produced only when the celery is in a normal growing condition, were abundantly manifest. It was supposed by the growers that the warm weather following the first early cold spell had much to do with the trouble. As a matter of fact, there was much warm weather after most of the celery had been removed to the cellar. From the state meteorological records it will be seen that the month of September was one degree colder than normal, October two and one-half degree below the normal, and for November the temperature was nearly five degrees (4.7°) warmer than the normal temperature as thus far determined. This rise of temperature was undoubtedly a serious thing, for warmth is an important factor in encouraging the spread of the fungus. The celery plants being arranged close together in the root house, the fungus spreads not only, it may be, from its former circumscribed spot areas to all parts of the leaf, but to neighboring more healthy leaves ; so that on the surface there is a dense stratum of the diseased material, and as the young blanched leaves push upward they in turn come in direct contact with the germs of disease. When once decay begins, bacteria, yeasts, and moulds readily effect rapid rotting of parts not easily affected by the blight itself. This was especially true where moisture was greatest. It is only to be regretted that we did not know earlier of the prevalence of the blight in the storage houses ; for its effects might then have been closely followed, and a knowledge of the exact conditions which accelerate the destructiveness of the disease could now be more accurately applied.

Nearly all of the root houses of South Lima are of the old style,—essentially a roof of boards upon which is thrown straw,

earth and manure, as represented in Fig. 56; but a brief discussion of specific styles of root houses will be considered later.

At Irondequoit, near Rochester, there are located some of the largest celery gardens of the state. At this place I found the condition of the celery a great improvement over that at South Lima. Nevertheless, considerable loss had resulted, and I was confirmed in the belief that the late blight was generally quite prevalent in the field during the past season. Here the disease had extended to the storage house product to an injurious extent, but there was evidently some important factor to account for its lessened effect. At Irondequoit there is a well drained gravelly soil, with clay subsoil, and it was noticeable that in the root-houses of this region there was much less moisture than in those of South Lima. It was this difference, in fact, which readily suggested that care should be taken with regard to the location of coops, especially for the contingency of unfavorable seasons.

Why the South Lima root houses contain more moisture, and hence were more severely visited, it is necessary to consider the surroundings. It is only within the past few years that celery has been grown to any extent in this region. Previous to this time there were about six hundred or more acres of bog land north and south of the Erie Railroad, which could have been purchased for almost nothing. Drainage of this area was since authorized, and it is this drained bog land which is now so valuable for the growth of celery. It is a true peaty soil, which burns very readily. This deposit is said to vary to about twenty feet or more in depth, and it is underlaid by a slight gravelly deposit, and then an impervious clay. Surrounded by high land on nearly all sides, this bog land lies as a natural basin in a glaciated region. Water seems to drain freely into this gravelly substratum and it is prevented from sinking further on account of the impervious clay. The peaty stratum above absorbs the water freely, and on account of its great capillary action it is capable of constantly pumping up the water from below, thus furnishing a soil in which celery grows luxuriantly. On account of this moisture, however, extra attention should be given to the disease question. With root houses located immediately upon such bog land, or upon slightly higher ground of approximately the same texture,

moisture is constantly pumped into the root house; and the necessarily inferior ventilation of such houses render them peculiarly favorable for the growth of the fungus, provided the temperature is sufficiently high. Good ventilation seems to be an important preventive factor, and the best evidence of this is afforded by the observation that the blight is less injurious along the central gangways of the cellars. On the basis of the location, however, it seems possible easily to account for the drier houses and better stored celery at Irondequoit; but it must be remembered that the past season was unfavorable everywhere. The celery which remained in the field longest was least subject to the abnormal conditions, and consequently less affected by the disease.

I also visited the celery gardens of Horseheads, near Elmira, where considerable loss had been reported. There the trench or banking system is still in vogue, and on account of the freezing weather, I could see but little of the stored product; yet those who attempted the trench system at Irondequoit during the past season were very unsuccessful, and on the whole it seems unwise to recommend it for protracted storage.

Remedies.

Although it has not yet been possible to conduct any remedial experiments, certain practical remedies are readily suggested by the conditions. A great desideratum is to bring to the root house a minimum amount of the disease. To this end, plants in the field should be sprayed regularly to prevent its appearance there. Any badly affected leaves should be stripped away before consigning to the coop, and it seems highly probable that fungicides may be used most effectively with the stored product. Without a great amount of extra labor, the leafy portion of the plants could be dipped in a weak solution of the ammoniacal copper carbonate before being stored, and as there is then no chance of its being washed off by rain, this measure should prove effective. The carbonate solution is mentioned because the only objection that might be urged against it is the slight deposit of copper. However, as most of the original green leaves are stripped off in the

trimmings, and as the plants are subsequently thoroughly washed, it seems that this efficient fungicide might be used without encountering the enmity of the most fastidious purchaser.

As previously mentioned, it is not known how the fungus causing this disease passes the winter, but it is quite likely that all diseased leaves and culls, both from the field and root house, are certain sources of contamination another year. It is doubtless impossible to destroy all such diseased material, but the more that is destroyed the less the probability of abundant reappearance; and if the disease is to be fought effectively, it must be fought in every stage.

Special Characters of the Fungus, and Artificial Cultures.

According to Halsted* the first mention of a *Septoria* on celery is by Briosi and Cavara†, in 1890. Here the fungus is given under the name mentioned above (*Septoria Petroselini* Desm., Var. *Aprii* B. & C.)‡. By Halsted, Chester, and Ellis this fungus has been compared with the species distributed by Briosi and Cavara, and they see no reason why our American form is not the same. There seems to be some doubt regarding the character of the spores. Halsted figures them uniformly septate, while Chester apparently saw no septa, and he describes them as "apparently non-septate, or septulate, guttulate." I have carefully examined a number of specimens from the field and from artificial cultures. Invariably mature spores are septate; but often the septa are not visible without the use of stains.

The spores germinate readily in agar, so that isolation cultures may be made in petri dishes. From such cultures, transfers to tubes of sterile bean stems have given good growths of the organism in a pure form. These cultures have given mature pycnidia in a few weeks. The perithecia are then formed superficially upon the bean stems, and formed of loosely woven, brown hyphae. Humphrey§ has suggested that the *Septoria* is connected with the *Cercospora* as pleomorphic forms of the same species. His suggestions, I believe, are based mainly upon gradations in spot characters. Chester was never able to find both fungi in the same spot, although both were sometimes found upon the same leaf. My cultures indicate as clearly as possible thus far that these two fungi have no genetic connection, if we may judge at all from growth characters. Under similar conditions, not only has the

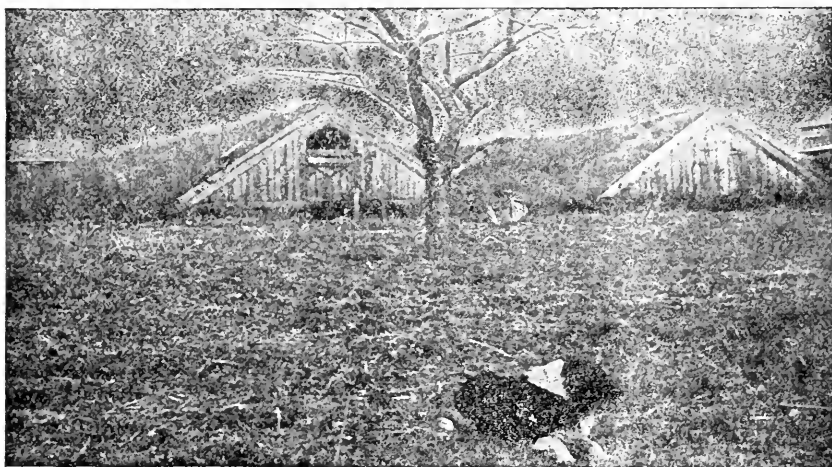
* Report, New Jersey Ag'l. Exp. Sta., 1891, p. 256.

† Funghi Parasitti Fascicola, VI. No. 144.

‡ Note. The only additional foreign mention yet encountered of a celery disease due to a *Septoria* is a short article by Sorauer on "Die Fleckenkrankheit des Sellerie," in Zeitschrift für Pflanzenkrankheiten, VI. (1896), H. 3, p. 191. The spores of this *Septoria* were described as non-vacuolate, non-septate.

§ Report Mass. Ag'l. Exp. Sta., 1891, p. 231.

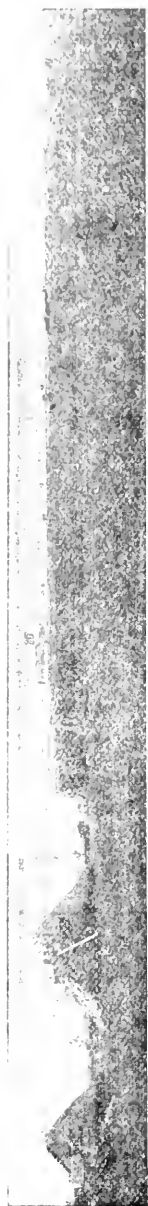
Cercospora produced only *Cercospora*, and the *Septoria* only *Septoria*, but the general character of the mycelium both in petri dishes and on bean stems is essentially distinct. Either or both of these fungi may have a perfect form, and these I am attempting to encourage; but I think it unnecessary to hold that the two fungi will be found to have the same perfect form. Should it be so, this fact would be of importance relative to the appearance of the disease in the root houses or storage cellars.



54.—View of celery houses at South Lima.

C. REMARKS ABOUT THE CONSTRUCTION OF STORAGE HOUSES.

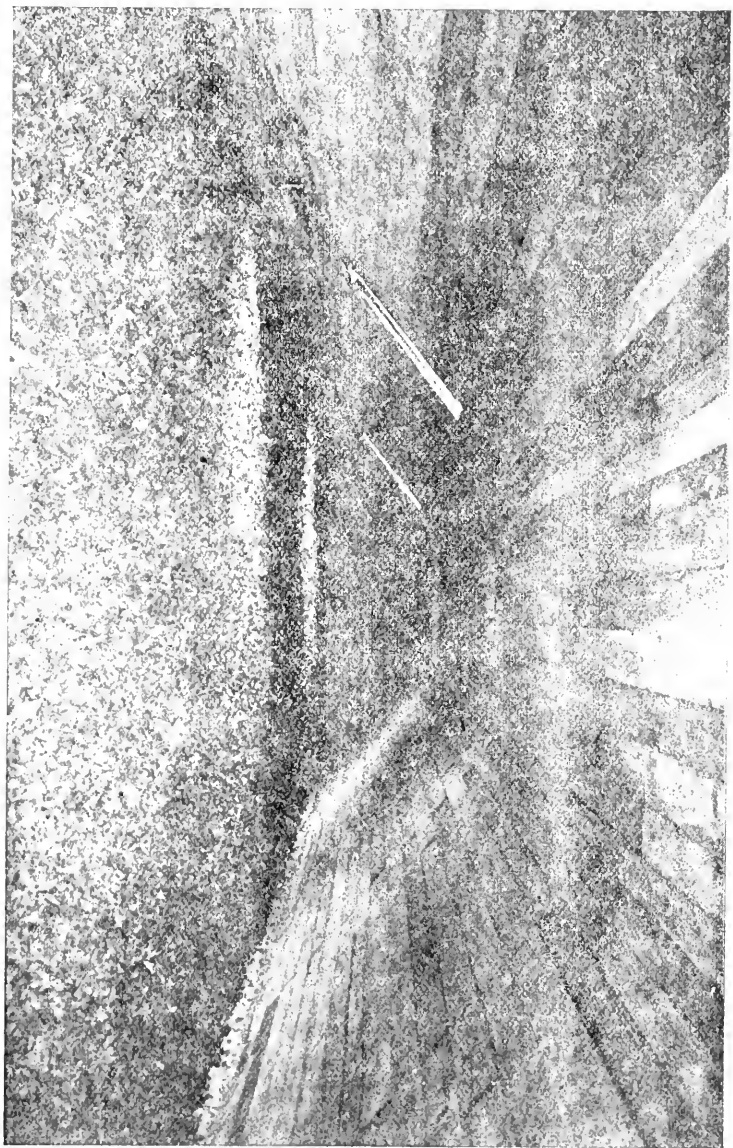
The growing demand for celery during the late winter months has recently brought about considerable improvement in the construction of storage houses; and as has been suggested, this matter is intimately associated with the disease question. The original type of root house, which I have not seen in New York, was essentially a rail coop. Upon the rails, straw and earth, or manure, were placed in sufficient quantity to keep out cold and moisture. Trade demands soon necessitated the form seen in Figs. 54, 55, 56, for the storage of celery. This form is well known, and the construction of this is easily made out with the aid of Fig. 56, which is an interior view. These houses are usually provided with double doors at both ends, two or more



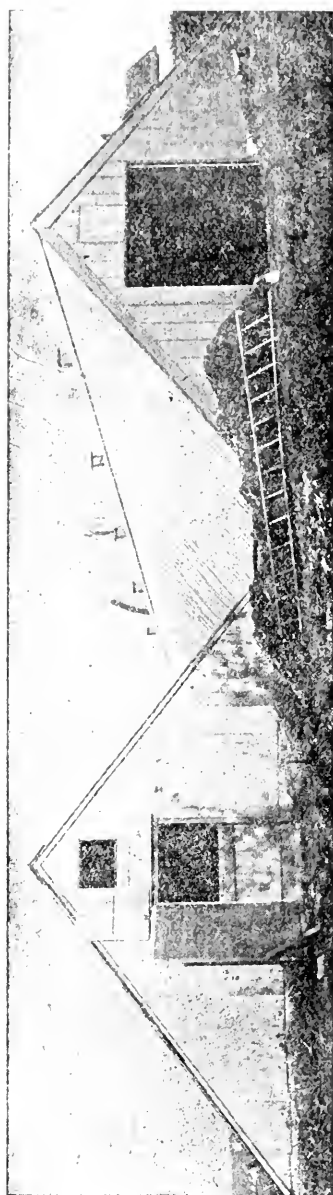
55.—*South view of the earth-covered houses of South Lima.*

windows, and with a number of ventilators. The greatest difficulty with these houses is that they rot down rapidly, and they may give some trouble with moisture. They are inexpensive, however, and the cost of construction is only about \$125. It may be suggested that in constructing root houses or storage houses of any kind the fundamental principles involved relative to the purpose of the structure should be constantly considered. To continue its vitality, succulence, and crispness, celery must continue in the storage house a very slow growth,—a growth sufficient to establish the roots in the soil and to complete the development of the inner leaves. Thorough freezing is fatal, but the lowest temperature at which freezing will not take place is most desirable. Not only does this temperature hold the plant in the desired condition of greatly suspended activities, but it renders next to impossible the growth of injurious fungi which would speedily wilt and rot it. In order, then, to approach the temperature sought, the house should be so snugly constructed as to provide against freezing. Again, it should be so provided with ventilating appliances that at any time advantage might be taken of any cold intervals to rapidly and effectually chill the house, after which it might be securely closed for a warmer period; and with this enclosed lower temperature remain for a time at a point more nearly that desired.

In Figs. 57 and 58 is shown one of the most improved root houses which I have seen in operation, and the photograph here reproduced was taken on the premises of Abram Franke, Irondequoit. With the usual excavation of eighteen inches or two feet, this structure has a brick foundation, and the roof is well provided



58.—Interior view of one of the houses shown in Fig. 57. See page 216.



57.—*Improved celery houses at Irondequoit.*

with air chambers and paper linings, affording the best protection against cold. The additional large air chamber above the collar beams, with its separate windows, seems also desirable. There are large double doors at each end, and the space between each outer and inner door is large, and the connections well arranged for the exclusion of cold air. It seems of sufficient interest to give a view of such a storage house; but full details of construction may not be entered upon in this connection. It will be seen that Fig. 59 shows the construction of the peak and collar-beam (k) of the house, and also of the ventilator (l, l). Fig. 60 shows the detail of the roof construction. The plate (h) is held firmly to the wall by a tongue (i) let into the brick work. The rafter is b. On this is a thickness of sheathing upon either side (a, c), with an air-space at e, and outer sheathing at g, and building paper at d and f. The cost of labor and materials is about \$500. An interior view of this house is shown in Fig. 58 (page 200). It was stocked with celery at the time this photograph was taken, and in

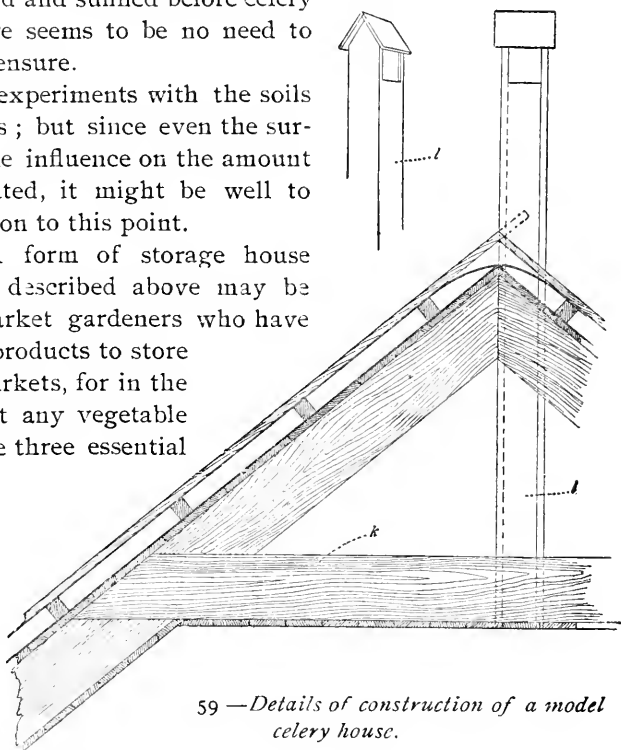
spite of having been harvested early, the plants were fairing well.

I have seen a cheaper and modified form of the above structure provided with a single air chamber outside of the rafters and first boarding, with tarred paper covering the final layer of boards. The odor of tar in the house has caused comment; but if the house is well aired and sunned before celery is admitted, there seems to be no need to fear even local censure.

I know of no experiments with the soils of storage houses; but since even the surface soil has some influence on the amount of water evaporated, it might be well to give some attention to this point.

The improved form of storage house which has been described above may be suggestive to market gardeners who have other vegetable products to store for the winter markets, for in the storage of almost any vegetable product the same three essential features are to be borne in mind, viz.: (1) protection against freezing; (2) a temperature so low that the activities of the plant may not be incited

and that the growth of fungi may be discouraged; and (3) proper protection against excessive moisture.



59 —Details of construction of a model celery house.

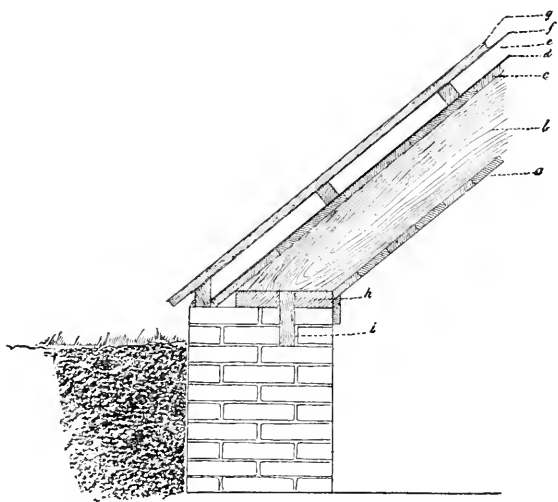
B. BIBLIOGRAPHY OF THE CELERY BLIGHTS.

Atkinson, Geo. F.—Note on the Cercospora of Celery Blight. Bulletin 49, Cornell Ag'l. Exp. Station, Dec. 1892.

—On the Fungus of Celery Blight. Am. Monthly Mic. Journ., **xiv**, 115, No. 4, Apr. 1893.

- Chester, F. D.—A Leaf Spot of Celery (Notes on Three New or Noteworthy Diseases of Plants). *Bull. Torrey Bot. Club*, **xviii.** 372, No. 12, Dec., 1891.
- A Noteworthy Disease of Celery. *Report Delaware Ag'l Exp. Sta.*, 1891, p. 63.
- Galloway, B. T.—Additional Notes on Celery Leaf Blight. *Report U. S. Dept. Agriculture*, 1888, p. 398.
- Report. U. S. Dept. Agriculture*, 1892, p. 234.
- Halsted, B. D.—Some Fungous Diseases of the Celery. *Report New Jersey Ag'l Exp. Sta.*, 1891, p. 250.
- Humphrey, J. E.—The Blight of Celery. *Report Mass. Ag'l Exp. Sta.*, 1891, p. 231.
- New York Ag'l Exp. Sta.—Some Celery Diseases. *Bulleten* 51, 1893.
- Scribner, F. L.—Celery Leaf Blight. *Report U. S. Dept. Agriculture*, 1886, p. 117.
- Sturgis, W. C.—Celery Blight. *Report Conn. (New Haven) Ag'l Exp. Sta.*, 1892, p. 44.
- Celery Blight. *Bulletin* 115, *Conn. (New Haven) Ag'l Exp. Sta.* p. 17, 1893.
- Provisional Bibliography of Works on Fungous and Bacterial Diseases of Economic Plants. *Bulletin* 118, *Conn. (New Haven) Ag'l Exp. Sta.* p. 14, March, 1894.

B. M. DUGGAR.



50.—*Details of construction.*

II. EXPERIMENTS WITH FERTILIZERS ON CELERY.

Upon the 26th of June, 1896, an experiment in fertilizing celery was laid out near Rome, New York, upon the premises of B. F. Richardson. The area was flat muck land, of half-wild meadow, broken up that year. It had never grown celery and had never received fertilizers.

The rows of celery were 28 rods long and 4 feet apart. Each row, therefore, represents about one-twenty-fourth of an acre of land. The plants of Golden Self-Blanching were set from four to six inches apart in the row, and the other varieties from six to eight inches. The fertilizer was carefully strewn by hand in a little furrow made upon either side of the row, after the plants were established in the soil, and it was then covered with earth. Care was exercised to keep the material from coming nearer than two or three inches to the plants. The season turned out to be very dry, and therefore the crop was less than it should have been. However, it was given excellent care, and there were marked differences in the plots when final notes were taken on the 31st of October. The celery was bleached by banking with earth.

The samples shown in the illustrations were taken by selecting six average plants from near the end of each row. The weights of these six average plants are entered in the records below. Chemical analyses were made from these samples, as displayed on page 229. The photographs showing the samples are all taken to the same scale. The weights of all the plants in each plot were also taken, but are not reported here.

VIII. Seven rows Golden Self-Blanching celery, set June 20.

Received July 17, 100 lbs., high-grade sulfate of potash, 14 lbs. to the row.

Crop rather poor. Fig. 61.

Six plants, 4 lbs., 1 oz.

IX. Seven rows Golden Self-Blanching, set June 20. Received July 17, 100 lbs., high-grade muriate of potash.

Crop very much better than in plot VIII., the stalks being much thicker, broader and stronger. The difference was such as to impress any observer. Figs. 61, 63.

Six plants, 5 lbs., 14 ozs.



61 — Two left-hand plants (VIII.) are from sulfate of potash rows and the right-hand ones (IX.) from muriate of potash rows.



62.—Plants 1 and 3 from no fertilizer rows; plants 2 and 4 from wood ashes rows.



64.—*South Carolina rock*, one bunch of six plants (XII.) and *bone black*, one bunch of six plants (XIV.).



65.—One bunch, six plants, *sulfate of potash* (XV.), and one bunch, six plants, *check* (XVI.). Notice the small stalks in the latter.

- X. One row Golden Self-Blanching, set June 20. No fertilizer. Crop almost worthless. Figs. 62, 63.
Six plants, 2 lbs., 9 ozs.
- XI. Three rows Golden Self-Blanching, set June 20. Received 200 lbs. wood ashes July 17. (The ashes analyzed 6.32 per cent potash, and 1.87 per cent phosphoric acid.)
Crop the best in the entire plantation, the stalks being numerous and very stocky and solid. Figs. 62 and 63.
Six plants, 7 lbs., 7 ozs.
- XII. Five rows Kalamazoo Broad-Ribbed, set June 24. Received July 18, 100 lbs. dissolved South Carolina rock.
Crop medium to poor, the stalks being too slender. Fig. 64.
Six plants, 5 lbs. 2 ozs.
- XIII. One row Kalamazoo Broad-Ribbed, set June 24. No fertilizer.
Crop unusually good for a check, being nearly equal to XII., but the row stood near a dead furrow and no doubt received some benefit from deeper plowing at that point.
- XIV. Five rows Kalamazoo Broad-Ribbed, set June 24. Received July 18, 100 lbs. bone black.
Crop much better than XII., the plants being much thicker and heavier. Fig. 64.
Six plants, 6 lbs.
- XV. Six rows White Plume, set June 25. Received July 18, 100 lbs. sulfate of potash.
Crop fair. Fig. 65.
Six plants, 5 lbs., 12 ozs.
One row in this plot (shown in Fig. 66) was almost ruined by being burned by the sulfate, the material having been scattered directly upon the row and much of it striking the plants.
- XVI. One row White Plume, set June 25. No fertilizer.
Crop poor, stalks many but small. Fig. 65.
Six plants, 5 lbs. 15 ozs.
- XVII. Six rows White Plume, set June 25. Received July 18, 200 lbs. sulfate of potash.
Crop heavy, with much broader and heavier plants than in XV.
- XVIII. One row Golden Self-Blanching, set July 8. Received July 28, 10 lbs. nitrate of soda.

Crop poor, the stalks being stocky but very sort. Fig. 67.

Six plants, 2 lbs. 14 ozs.

XIX. Two rows Golden Self-Blanching, set July 8. No fertilizer.

Crop worthless. Fig. 67.

Six plants, 1 lb. 8 ozs.

XX. Seven rows Golden Self-Blanching, set July 21. Received July 28, 25 lbs. nitrate of soda, 75 lbs. dissolved South Carolina rock, 100 lbs. sulfate of potash.

Crop fair. Fig. 67.

Six plants, 4 lbs. 6 ozs.

XXI. Two rows Golden Self-Blanching, set July 21. No fertilizer.

Crop worthless.

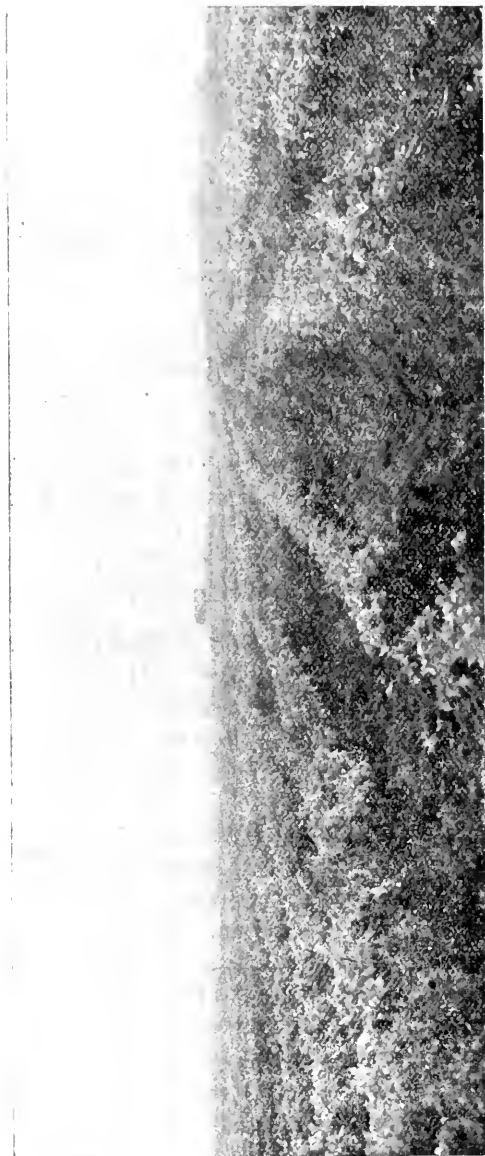
XXII. Seven rows Golden Self-Blanching, set July 22. Received July 28, 50 lbs. nitrate of soda, 100 lbs. dissolved South Carolina rock, 200 lbs. sulfate of potash.

Crop late because of late setting, but Mr. Richardson regarded it as the best lot on the plantation considering the chance it had.

All these records show that wood-ashes gave the best results, although a combination of nitrate of soda, South Carolina rock and sulfate of potash (plot XXII.) promises to do well. Muriate of potash excelled the sulfate. Nitrate of soda alone gave poor returns. The check (no fertilizer) plots were not worth the growing.

It should be said that although this test was made with much pains, no generalizations should be drawn from it. The subject needs to be studied a number of years and in more detail before definite conclusions can be drawn. This paper is meant as a report of progress, and to call the attention of those who are experimenting with celery fertilizers to our desire to obtain more specific information. We shall endeavor to make similar experiments the coming season. It will be observed, however, that the results upon these plots were as emphatic as could have been wished.

The chemist was asked to help interpret the results, and his analyses of a plant from each plot, and of the soil, are given below.



63.—Celery field, showing muriale of potash rows at a, the no fertilizer rows at b (notice how narrow and small the rows is), and the wood ashes rows at c.



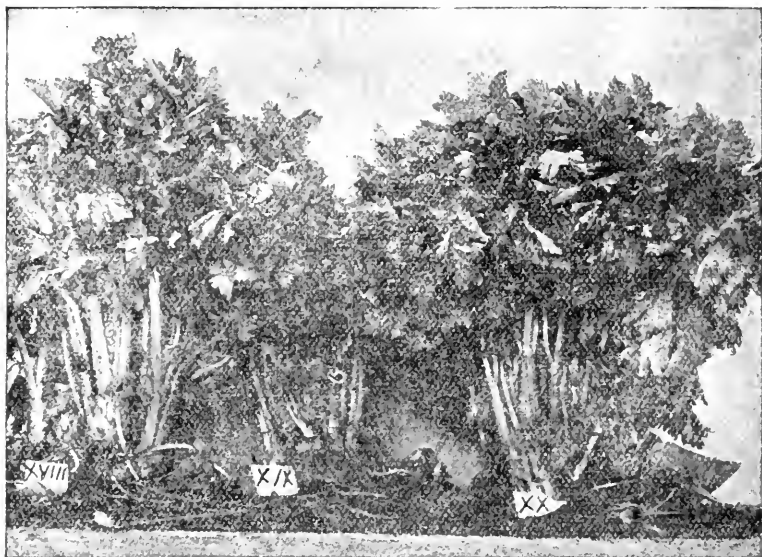
66.—Sulfate of potash plot, showing one row burned by the application of the potash on the plants.

The report of George W. Cavanaugh, assistant chemist to the Experiment Station, is as follows :

" The four principal fertilizing elements nitrogen (N), phosphoric acid (P_2O_5), potash (K_2O) and lime (CaO) were determined in the dry substance of the celery plant, roots excluded.

" In samples XVIII. and XX., nitrates were found in appreciable quantities. Potash seems to be the most variable ingredient ranging from 4.63 per cent to 1.97 per cent.

" Whenever potash was used in the fertilizers it is found in



67.—Bunches of six plants of each of three lots: XVIII., nitrate of soda; XIX., no fertilizer; XX., nitrate of soda, S. Car. rock, sulfate of potash.

greater amount in the plant than in those plants not so fertilized, except in case of No. XVI., which for some unknown reason ranks highest.

" In sample XVIII. there seems to be evidence of a partial replacement of potash by soda.

" The same result seems to follow from a comparison of samples VIII. and XX. In the former when sulfate of potash was used

alone 4.40 per cent. was found in the plant as against 2.84 per cent where nitrate of soda was used with the potash. Phosphoric acid and lime seem to be quite constant.

"While no conclusive result can be drawn from this one set of analyses it seems probable that nitrogen and potash are the plant-foods most required."

ANALYSES OF CELERY PLANTS.

Plots.	Nitrogen per cent.	Phosphoric acid per cent.	Potash per cent.	Lime per cent.
VIII. K_2SO_4	4.24	.72	4.40	.51
IX. KCl	3.44	.78	4.48	.40
X. None	4.08	.67	2.96	.43
XI. Ashes	3.64	.90	3.26	.41
XII. P_2O_5	4.17	.86	2.46	.36
XIV. P_2O_5	3.77	.93	2.48	.38
XVI. None	4.47	.89	4.63	.49
XVIII. $NaNO_3$..	4.81	.70	1.97	.41
XIX. None	4.55	.79	2.80	.50
XX. $\left\{ \begin{array}{l} NaNO_3 \dots\dots \\ K_2SO_4 \dots\dots \\ P_2O_5 \dots\dots \end{array} \right.$	4.46	.84	2.84	.42

It is apparent that these figures throw little light upon the reasons for our curious results,—the high yield with potash and the very small yields with nitrogen. It was then decided to make an analysis of the soil, to find if its composition could aid in interpreting the results of the experiment. The soil was found to show no acidity. Mr. Cavanaugh found a very high content of nitrogen, phosphoric acid and potash. It was then suggested that the potash, whilst large in amount, might be unavailable. Accordingly, the potash and phosphoric acid were tested for availability, when it was found that the potash was practically all unavailable whilst the phosphoric acid was in a very available condition (as determined by digesting in a one-half per cent of hydrochloric acid for 5 hours at 40°C). Mr. Cavanaugh's figures are as follows :

ANALYSIS OF CELERY MUCK, CALCULATED TO DRY
SUBSTANCE.

			<i>Availability.</i>
Nitrogen.....	1.87	per cent.	
Phosphoric acid.....	.50	"	.065
Potash.....	.54	"	merest trace
Lime.....	2.20	"	
Humus.....	29.29	"	

The unavailability of the potash seems to explain the excellent results which were obtained from the wood ashes. The chemist now suggests the use of caustic lime upon the land, in the place of fertilizers, in order to determine if the potash may be made available. It is expected that experiments will be continued along this interesting line this year.

L. H. BAILEY.

Bulletin 133.

April, 1897.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

ENTOMOLOGICAL DIVISION.

THE
Army - worm
IN NEW YORK.



"June 27, 1743. There are millions of worms, in armies, appearing and threatening to cut off every green thing ; people are exceedingly alarmed."

"July 1, 1743. Days of fasting are kept in one place and another, on account of the worms." *Extracts from the Journal of Rev. Thomas Smith, Falmouth, Me.*

By M. V. SLINGERLAND.

PUBLISHED BY THE UNIVERSITY,

ITHACA, N. Y.

1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
EDWARD A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.

In pursuance of the provisions of Chapter 128 of the Laws of 1897, the following persons have been appointed investigators and instructors in the College of Agriculture of Cornell University to serve throughout the state according to the needs of the several localities for a portion or all of the year.

J. W. SPENCER,	M. V. SLINGERLAND,	A. L. KNISLEY,
G. T. POWELL,	B. M. DUGGAR,	C. E. HUNN,
G. A. SMITH,	J. L. STONE,	H. B. CANNON, Chief Clerk.

Office of the Director, 20 Morrill Hall.

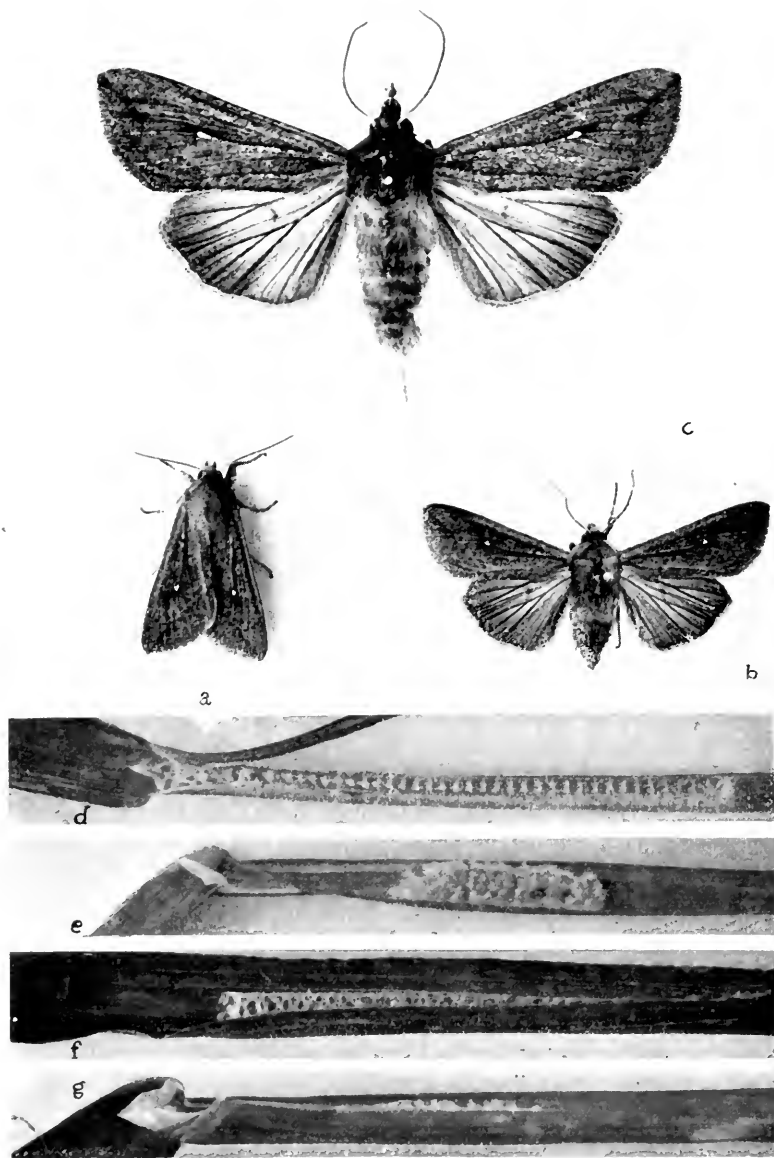
The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums.
132. Notes Upon Celery.
133. The Army-worm in New York.



68.—*Army-worms at work on a corn plant. Nearly natural size.*



69.—a, army-worm moth at rest, natural size; b, moth with wings expanded; c, the moth, twice natural size; d, e, f, g, eggs of army-worm moth as they are laid in grass leaves, much enlarged.

THE ARMY-WORM IN NEW YORK.

Leucania unipuncta Haworth.

Order LEPIDOPTERA ; family NOCTUIDÆ.

Perhaps no common name of an insect is so familiar to agriculturists and others as that of "army-worm." However, but comparatively few people are familiar with the story of an army-worm's life,—what it is, where it comes from, the wonderful transformations it undergoes, and many other interesting facts about it. The most serious outbreak of this insect known in the history of New York state and of the country at large occurred last year. As the newspapers teemed with more or less exaggerated accounts of its ravages and habits, it attracted unusual attention from all classes, resulting in a greater demand for definite, detailed, illustrated information than we were able to supply at the time. Fortunately we succeeded in breeding many of the insects through their different stages and broods in cages at the insectary, and were thus enabled to obtain many new and life-like pictures of army-worms, their parents, and other interesting phases of their life. In order that agriculturists and others may be prepared with definite information in case of future outbreaks of the insect in New York, the following account of its work in the state has been prepared.

WHAT ARE ARMY-WORMS.

The name "army-worm" has been applied to several different insects which sometimes appear in great numbers and devastate large areas of field or orchard crops. The term is sometimes applied to the canker-worm in many localities in our state. However, what has come to be recognized as the army-worm proper or *the* army-worm by entomologists is shown at work, nearly natural size, in figure 68, and twice natural size in figure 70. It is a striped, sixteen-legged larva or caterpillar, resembling, and in fact, closely allied to, the well-known cutworms. It is aptly

called the "army-worm" because whenever it appears in injurious numbers, after destroying the vegetation in one field, the caterpillars always march like an army to other fields. The parents of army-worms are moths (see figure 69) which belong to a great family of insects known as Noctuids or owlet-moths. Most of the moths or "millers" that fly into our houses at night, attracted by the lights, are members of this family.

THE CATERPILLARS AND THEIR PARENTS DESCRIBED.

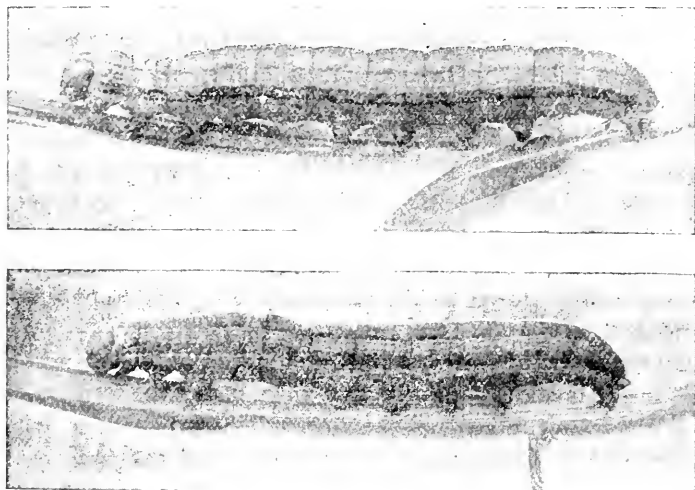
When full-grown, army-worms measure nearly an inch and a half in length. They are of a general greenish-black color, much lighter on the venter which is more or less mottled with blackish, and each side bears several distinct stripes.

Along each side of the body extend three stripes of about the same width; the one just below the spiracles is of a light greenish-yellow with whitish edges; the one bordering on the dorsum is a little darker with a mottled greenish-black center and narrow white lines along its edges; the central stripe, or the one with the spiracles in its lower edge, is black, sometimes lighter along its center. The dorsum is finely mottled with greenish-black and closely resembles the dark stigmatal stripe in color; along the middle line of the dorsum there extends a narrow white stripe, usually quite indistinct except on the thoracic and anal segments. The six true legs are light brown in color, and each pro-leg is marked with a large, shiny, blackish spot. The head is of a greenish-brown color, rather coarsely mottled with black which merges into distinct blackish stripes along the sutures.

There is considerable variation in general color among the caterpillars, some being much lighter than others, due to differences in the intensity of the stripes and the mottlings on the body. In some cases this difference was so great as to lead to doubts of the specimens being true army-worms. Two extremes of variation are illustrated in figure 70; in one instance all the army-worms received from one locality were like the one in the upper part of the figure, while those sent in from another army were all dark like the lower one.

The parent insect—the moth—is shown natural size at rest at *a*, and with wings expanded at *b*, in figure 69; at *c* in this figure the moth is represented twice natural size. As these figures indicate, the adult insect is a very plain little "miller." Its principal characteristic markings are the distinct white spot near the center, and the dark shade or stripe in the upper outer angle, of

each front wing. The general color of the front wings is clay or fawn, much specked with black scales; a row of more or less distinct black dots, one on each vein, crosses the wing about midway between the white spot and the outer margin; often the veins are outlined for a portion of their length by white scales. The hind wings are of a dusky brownish color, darker towards the outer margin, and with the veins blackish.



70.—*Light and dark varieties of army-worms, twice natural size.*

There are no differences in color between the male and female moths, but the abdomen of the female is more pointed, and her antennæ are much smoother than the hairy or ciliate antennæ of the male.

The moths are very uniform in their coloring and markings; practically the only variations are in the number of the black scales scattered over the front wings, and some moths are a trifle lighter or darker with more or less of a reddish or rust tinge. There is considerable variation in size, the distance across the outstretched wings ranging from a little less than one and a half inches to two inches. The moths bred from the lightest colored army-worms do not differ from those reared from the darkest caterpillars.

The moth may be readily distinguished from other similar

moths by the conspicuous white spot in the center of each front wing. It was doubtless this distinctive mark that suggested the specific name of the insect—*unipuncta*.

HISTORICAL.

Its general distribution and early history.—Apparently the native home of the army-worm is in North America, although it is known to occur in England, South America, India, Java, Maderia, Australia and New Zealand, thus making it nearly a cosmopolitan insect. However, it is known as an especially injurious insect only in the United States, east of the Rocky Mountains and in Canada. "The region in which it especially flourishes extends from Iowa to Maine and from Texas to Alabama. East of the Blue Ridge Mountains its southerly range as an injurious species extends to North Carolina. The moth is often captured outside these limits and frequently in considerable numbers, but the caterpillar does not seem elsewhere to be a factor in agriculture."

What has come to be recognized as the first published account of this insect is quoted on the title page below the frontispiece. 1743 is always mentioned as the first army-worm year of which we have pretty definite proof. Perhaps it was the army-worm that appeared by the millions in Massachusetts in 1762 and ate up the corn. Graphic and definite accounts have been recorded of the ravages of the insect in New England in 1770 and 1790. The next army-worm year was in 1817, and since 1825 the insect has appeared in injurious numbers somewhere in the United States almost every year; but rarely, if ever, has the insect been destructive in the same locality in two successive years.

The army-worm was known in the early chronicles as "the black worm;" just when it came to be known as "the army-worm" we have not ascertained. Sometime in the latter part of the eighteenth century, a specimen of the adult insect—the moth—found its way into the then celebrated collection of a Mr. Francillon in London. Upon the breaking up and sale of that collection early in this century, this moth passed into the possession of a Mr. Haworth, who published a description of it in 1810; he named it *unipuncta*, the white speck.

It is a curious fact that no one seems to have discovered what the parents of the army-worms were like until 1855, when Mr. Kirkpatrick reared some of the moths in Ohio. It was not until 1861 that Dr. Fitch, then State Entomologist of New York, identified the army-worm moth as the same insect which had been described in England fifty years before.

Previous army-worm years in New York.—Apparently the first record of the occurrence of the army-worm in New York state is the following taken from the *Albany Argus* for 1817: "The black worm is destroying the vegetation in the northern towns of Rensselaer and the eastern section of Saratoga counties. Many meadows and pastures have been rendered by their depredations as barren as a heath."

The insect does not seem to have again attracted attention in our state for forty-four years or until 1861.* This is by far the most celebrated of the army-worm years, because the worms appeared in destructive numbers over an immense extent of country (twenty states were damaged to a greater or less extent), and also because this outbreak called forth several elaborate articles by the leading writers upon insects. In New York state the worms appeared in the vicinity of Buffalo, and at several other points towards the western and southern line of the state; and also in many places on Long Island.

In 1872, an army of the worms was reported from Tioga County. Again in 1875, which was a notable army-worm year throughout the country, the insect was very destructive in the same county and was reported as swarming on Long Island. Dr. Lintner states (*Country Gentleman*, 1877, p. 347) that the worms abounded in many portions of the state in 1876 and did serious damage, but the next year the moths were rarely seen. 1880 was also a notable army-worm year, especially in New York state. The worms were destructive in the southern and eastern counties of the state in August, and on Long Island the damage done in June was very great, creating much alarm. Bushels of the worms

* Dr. Riley states (3d Rept. Ent. Com., p. 95): "From an old number of the *Country Gentleman*, we learn that it did some damage in western New York." We have been unable to find this reference, nor does Dr. Fitch refer to it in his detailed account published in 1861.

were captured in post-holes dug in ditches on Long Island in 1880, but in 1881 scarcely any were seen on the Island.

In August, 1882, the insect appeared in formidable numbers near Saratoga Springs, and was also very destructive in Suffolk County. In 1885, the worms were reported as doing much damage in oats in Orange County. They next attracted attention in Orleans County in 1888, where they injured the barley crop twenty per cent. Two years later (1890) the worms are reported to have destroyed many acres of timothy in Queen's County. This completes the record of appearances in destructive numbers of the army-worm in New York state previous to 1896.

NOTES ON THE OUTBREAK OF 1896.

During the spring and summer of 1896, the army-worm appeared in destructive numbers in portions of ten states, constituting what is probably the most serious outbreak of the pest known in the history of the country. In some states most of the damage was done in May, but usually it was the July brood which appeared in almost incredible numbers; in a few localities, however, it was not until September that the pest was seen in injurious numbers.

In New York state the outbreak was the most wide-spread and most destructive of any before recorded. We have authentic reports of armies of the worms having worked in forty-eight of the sixty counties of the state. We heard nothing of the insect in the state until about July 1st, when letters, telegrams, and even long-distance telephone messages began to pour in from all sections. A circular letter and telegram were prepared and for nearly three weeks in July, we were kept busy answering the urgent requests of the hundreds of correspondents whose crops, in many cases, were disappearing, often at the rate of an acre or more per day, down the throats of the armies of hungry worms.

Nearly all kinds of field crops were ravaged by the caterpillars. Corn and oats seem to have suffered the most; there is no data upon which to base any definite estimates, but one may safely say that thousands of acres of these two crops alone were ruined by the worms in New York. In many localities, rye, barley, wheat, millet, meadows, pasture lands, and Hungarian grass suffered

equally as much as, and in some cases more than, corn or oats. One army of the worms which we visited had stripped every leaf from forty acres of rye and had cut off one-third of the heads before the farmer discovered the presence of the enemy on his farm. When we reached his place, his corn and oats in adjoining fields were disappearing at the rate of an acre or two a day, and the lane across which the worms were marching presented a desolate appearance, scarcely a green blade of grass having escaped the jaws of the hungry horde. Many farmers had similar experiences with the insect. Often whole fields of rye or other crops would be ruined before the culprits were discovered. Some farmers, hoping to save their oat crop cut the grain before it was fairly ripe, binding it into bundles and "shocking it" as usual; but quarts of the worms simply gathered under and in these shocks and continued their destructive work on the drying grain, often ruining the whole crop.

The favorite breeding places for the worms are the low places in pastures and meadows where the vegetation grows the rankest, and in many cases it was evident that the armies started from such places in 1896. Often, however, the indications were that the worms were born in the rye or oat field where their ravages were first noticed. As there was nothing to indicate that 1896 was to be an "army-worm year," no one was on the lookout for the insect, and doubtless few, if any, farmers discovered the worms when they were small and before they had been forced to abandon their breeding grounds and march to new pastures in search of food to satisfy their voracious appetites. The larger proportion of the damage done in 1896 might have been averted had the farmers been able to apply remedial measures before the worms had spread far from their birthplace instead of when they were half-grown or more, with larger appetites, and were on the march.

Although the outbreak of the insect was so general all over the state, oftentimes the worms were confined to one or two farms in a town; one man's crops might be ruined by them while another army of the worms might not occur within a radius of several miles.

To fully realize the destructive capabilities of the insect one must see, no description will suffice, an army of the worms on the

march and at work. In most cases, the caterpillars in each of these armies must have been numbered by the millions; even an approximate estimate of the number of worms in a single army would have been impracticable. Oftentimes when an army was marching across a lane or roadway, nearly the entire surface of the ground for several rods would be covered with the crawling mass of worms; one could not step without crushing several of them. Is it to be wondered at that when such a vast horde of hungry creatures reach a field of young corn, acres of the plants soon look like the one shown in figure 68? They soon strip all the leaves from the stalks of oats, rye, and similar plants, and often cut off many of the heads, leaving them uneaten on the ground. In one instance, a barn loomed up before the worms directly in their line of march, but nothing daunted, many of them valiantly scaled the perpendicular wall and soon succeeded in getting over the eaves onto the roof. Here, however, they met their Waterloo, either from the exposure on the heated shingles to the sun's rays or from other causes, and a windrow of dead worms was formed under the eaves.

The worms feed mostly at night, remaining hidden during the day in the soil or under chunks of dirt or anything that will afford protection; many of them find shelter down in the cavities at the bases of the unfolding corn leaves. On cloudy days the worms usually feed during the day, and often many of the worms may be found at work on sunshiny days.

In almost every case it was the July brood of worms only which ravaged crops; apparently in none of these instances did the May or the September broods of the caterpillars attract attention. However in at least two localities (Cheviot, Columbia Co. and Warwick, Orange Co.), it was only the September brood of worms which were numerous enough to be noticeably destructive; curiously enough the insect had not been seen in these localities before during the year. Thus, while in most localities all of the damage was done in July, and in a few places the worms were not injuriously numerous until September, it is to be noted that we have no evidence that more than one of at least three broods of the insect was noticeably injurious in any locality during 1896. A probable explanation of this noteworthy fact will be brought

out later on in the discussion of the enemies of the army-worm.

INDICATIONS OF THE PRESENCE OF ARMY-WORMS.

Unfortunately, even when army-worms occur in immense numbers, farmers rarely become aware of their presence until they are about half-grown, when they have usually spread some distance from where they hatched, and have often already done much damage. Last year, one farmer noticed that a forty-acre field of rye seemed to be ripening unusually early, but he did not discover the cause until a few days later when an immense army of the caterpillars began marching from this field into adjoining corn and oat crops; an examination of the rye showed that the worms had eaten nearly every rye leaf in the whole field and had also cut off about one-third of the heads. That the insect gets such a start before it is discovered, is doubtless largely due to the fact that it is not a "standard" pest (that is, one which may be expected in injurious numbers almost every year, like the Codlin moth) and thus farmers, not expecting it, are not on the lookout for it. As it is impossible to predict with any degree of certainty when army-worms may be expected, this unfortunate condition of affairs seems to have no practicable remedy.

A whole army of the worms are often hatched in a few square rods or less of rank growing grass in a low, damp spot in a large pasture or meadow. Such a small area is easily overlooked, although the little caterpillars may have eaten enough of the grass to enable one, on the lookout for them, to readily discover their presence before they have spread far and have done much damage. It would be an easy matter to check an army of these very destructive worms in field crops if it could be discovered before it had spread far from its comparatively small breeding ground.

WHAT ARMY-WORMS EAT, AND THEIR CAPACITY FOR INJURY.

Army-worms include in their menu a wide range of food-plants. They seem to prefer the grasses and grains. Timothy, wheat, oats, corn, rye, and barley, they seem to relish best; and millet, Hungarian grass, sorghum, or flax do not come amiss. They have also been known to eat onions, peas, beans and other garden

crops. Cranberry crops have been greatly damaged by them, and in one instance "an army of the worms, in passing through a strawberry patch, devoured both the leaves of the plant and the unripe fruit." Experiments have shown that in confinement the worms will live, thrive, and undergo their transformations when fed exclusively upon either the garden poppy, beet, lettuce, cabbage, raspberry, onion, parsnip, radish, carrots, or pea. They refused to feed, however, on bean, cotton, grape, and hemlock.

Ordinarily clover is not eaten by the worms; it is said that "a timothy field is often eaten to the ground, leaving the clover scattered through it standing." In 1880, however, a remarkable exception occurred in New Jersey where in some localities clover-eating by the worms was the rule and not the exception.

Fruit growers have little to fear from this pest. In one case, as mentioned above, a strawberry bed was injured by an army of the worms, and there is but one record of their having eaten the leaves of fruit trees.

Finally, it may be of interest to know, that when on the march, the worms have been known to not hesitate at cannibalism to satisfy their hunger, and many individuals have been killed and devoured by their stronger comrades.

It is a striking fact, that, although the army-worm is widely spread throughout the world, it is notably destructive only in the northern half of the United States; and in this section, its capacity for injury is very great. Almost every year it appears somewhere in this area and injures crops to the amount of hundreds of thousands of dollars. As one can readily understand, it is a difficult matter to estimate the loss occasioned by the ravages of an insect over a large area. The damage done by the army-worm in western Massachusetts in 1861 has been estimated at \$500,000. The oat crop of Indiana and Illinois is estimated to have been damaged by the insect in 1881 to the extent of about \$750,000. We have but little data upon which to base an estimate of the injury done by the worms in New York in 1896. It has been stated, however, that the damage from the insect in Massachusetts last year would amount to upward of \$250,000; and we believe that at least as many dollars worth of the crops of timothy, oats

and corn of New York farmers also went down the throats of the ravaging armies of the worms in 1896.

THE STORY OF AN ARMY-WORM'S LIFE.

Only those who have closely watched the growth and wonderful transformations of an insect can realize how fascinating is such a study of life. It is astonishing how much ignorance there is among the great mass of the people in regard to insects and their life-stories. But few of the hundreds of farmers who suffered from the ravages of the army-worm last year, had any definite ideas as to where the worms came from or what became of them. Our observations lead us to believe that those who know the most about the habits and lives of their insect pests, are the ones who best succeed in conquering these minute foes. Furthermore it must be more interesting to plan a campaign against an enemy with whose habits one is familiar than to go at it haphazard as many do. The life-history of the army-worm varies somewhat in different latitudes; the following discussion is applicable, in most cases, only to New York state and similar latitudes.

The egg stage, or how and where its life begins.—Each army-worm begins life in a minute, round, nearly smooth egg of a distinct, yet very light yellow color,* and measuring from 6 mm. to 7 mm. (about .025 of an inch) in diameter. In seeking a place to lay her eggs, the mother insect seems to preferably choose the rankest tufts of grass in pastures or where the growth is the rankest in grain fields or meadows. Finding a suitable stalk of grass or grain, the moth clasps a blade or leaf with her legs and then deftly thrusts her ovipositor into the as yet unfolded base of the leaf or more often down into the sheath where it surrounds the stalk. She is thus engaged from one to four minutes at a spot. During this time from 10 to 50 or even more eggs may be laid and covered with a thin white glutinous substance which fastens them together and also draws the sides of the leaf close around them,

* The egg has always been described as smooth and white. Yet the hundreds of eggs which we have seen had a distinct yellowish tinge, and under the microscope the surface of the shell was prettily marked with a net-work of very fine striæ or ridges; the white substance with which the moth covers her eggs obscures this net-work.

so that nothing but a narrow glistening white streak is visible, as shown much enlarged at *f* and *g* in figure 69. At *d* and *e* in the same figure, part of the sheath of the leaf has been removed to show the eggs and their glutinous covering. Observations indicate that most of the eggs are laid during the earlier part of the night, the moth remaining hidden during the day. It is also said that early in the season the moths prefer to oviposit in the cut straw of old stacks, in hayricks, and even in old fodder stacks of corn or in old bits of corn stalks scattered about in pastures; eggs have also been found in the spring in young grain.

The immense numbers in which the army-worm often occurs would lead one to suspect that the parent moth must be quite prolific. Careful observation has shown this to be true, for as many as 737 eggs have been found in the body of one moth. They develop rather slowly in the ovaries, as a week or more often elapses between the time of emergence of the moth and the commencement of egg-laying.

Eggs laid in the sheath of grass-blades in our cages in November hatched in from 8 to 10 days. This agrees with other records.

Growth and peculiar habits of the worms.—A day or two before the eggs hatch, the brown jaws of the developing caterpillar can be plainly distinguished through the shell.

The newly hatched worms are nearly 2 mm. (.078 of an inch) in length and are of a translucent whitish color. The head is of a dark brown color and the thoracic shield a little lighter. There are no indications of the stripes which mark their body later. The first pair of abdominal pro-legs are only about one-half as large as, and the second pair are slightly smaller than, the last three pairs. All these undeveloped pro-legs bear the usual hooklets, but whether all are functional or not, we have not determined.

In moving, the little caterpillars loop along like measuring-worms, and when disturbed they drop themselves down at the end of a silken thread which they spin, like canker-worms. As we had seen nothing recorded that would indicate such a habit, we were surprised to find that for the first day or two of their life the caterpillars fed upon the shells of the eggs from which they had just hatched and upon the white glutinous substance which surrounded the eggs. In each case under our observation the little worms ate almost every vestige of these substances before they attacked the live grass leaf. Soon after they began feeding upon the grass, this green food gave their bodies a greenish color. After feeding for a few days, the little worms moult or shed their skin. In the second stage of their life as a caterpillar they have the same looping and spinning habits as before, and the stripes of

the future mature worms begin to appear. After the second moult occurring 3 or 4 days later, or in the third stage, the caterpillars are more distinctly striped, their looping habit is lost, but the front pro-legs are still the smallest, and instead of spinning down when disturbed, the worms curl themselves up. When they reach the fourth stage, 3 or 4 days later, they have many of the characteristics of the mature caterpillars, shown in figure 70, and the pro-legs are of nearly equal size. Two more moults occur at intervals of 3 or 4 days before the worms become full-grown.

This insect thus usually spends from twenty to thirty days of its life as an army-worm or caterpillar.

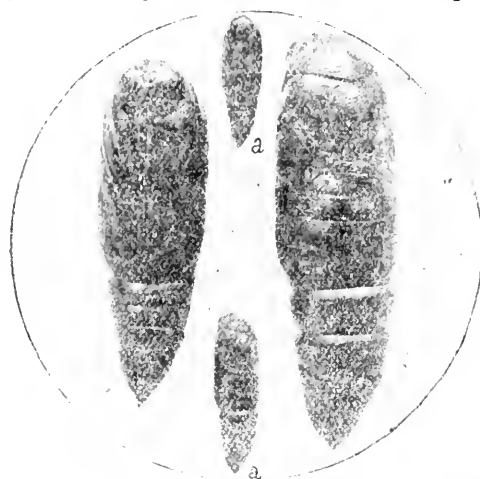
Army-worms occur every year in most grass-lands, but their habits of feeding mostly at night, remaining hidden during the day, and of dropping when disturbed, render them quite difficult to find unless they occur in large numbers; when young the worms quite closely mimic their food-plants, which also renders their detection less easy. It is said that sometimes one may pass daily through a grass plot where the worms abound, and never suspect their presence until the plot begins to look bare in patches. Their night-feeding habit reminds one of their near allies in the insect world—the cutworms. But the army-worms do not seem to exhibit the wasteful cutting habit of the cutworms, except when they sometimes cut off the heads of wheat and similar grains; usually only the leaves of the grasses and grains are eaten.

The fact that the traveling of the worms in large armies is an abnormal habit, cannot be too strongly insisted upon. It is only when so very abundant, and the food of the vicinity in which they were borne is destroyed, that they march in search of further supplies; they are usually from one-half to two-thirds grown when the march begins.

The rate of travel of the worms when on the march of course varies with the nature of the surface over which they have to crawl. They have been observed to travel at the rate of from one to nearly three feet in a minute, or from four to ten rods per hour.

The Transformations Through the Pupa Stage to the Adult Insect.—Soon after reaching its full growth, an army-worm ordinarily burrows into the ground for an inch or two and there twists its

body about until a smooth cavity or cell is formed. In this earthen cell the caterpillar sheds its skin for the last time and becomes a dark brown, apparently lifeless object—the pupa—shown natural size (at *a*) and enlarged in figure 71. In the latter



71.—The pupae into which army-worms transform. Natural size at *a*.

had suddenly left their fields and had disappeared; this simply meant that they had gone into the ground to pupate. When the worms occur in great numbers, many of them change to pupæ under stones, boards, chunks of dirt, or rubbish of any kind, without entering the ground; at such times more or less silk is sometimes spun around the body and particles of earth adhere

to it thus forming a slight cocoon. The length of time the insect remains in the pupa state varies with the climate and the season. In the spring and fall the pupa stage apparently lasts from three to four weeks in New York state, while in July only from ten to fifteen days was spent by the insect as a pupa last year.

Habits of the moth.—Soon after emerging from their cramped quarters in the pupa, the moths gradually expand their wings and may be seen, resting quietly, hidden during the day in the grasses, in the position shown at *a* in figure 69. The moths usually begin flying about sunset and are doubtless active during the greater part of the night. Their flight is low and is characterized by a quick darting motion. Upon first alighting the wings are kept in motion with a rapid quivering for a moment. They do not appear to be as readily attracted by lights as many other moths. In our extensive trap-lantern experiments conducted in

1889 and 1892, only *one* moth was attracted to the lanterns during the two years.

Doubtless the army-worm moths that emerge in the spring and summer do not live more than two or three weeks ; some of them which emerge in the fall live all winter in hibernation. They are fond of liquid sweets, such as a sugar solution painted upon trees to attract other insects ; and last year in southern New Jersey they were found in large numbers among the plant-lice on melon vines, doubtless attracted by the "honey dew" secreted by the aphids. They undoubtedly feed upon the nectar of various flowers for they have been taken in the evening upon the blossoms of clover and soap-wort ; they have also been found feeding on the blossoms of apple, honeysuckle, and yucca. In August we tried to persuade the moths to lay eggs in our cages where there was no food for them, but all died without ovipositing. We fed the moths which emerged in the fall with sweetened water and they oviposited freely in the cages.

The number of broods of the army-worm in New York.—The army-worm apparently did not attract attention in any locality in New York in 1896 until about July 1st. Then the worms were half or two-thirds grown and had begun to march in armies. From some of these caterpillars we reared the adult insect as early as July 25th, and many moths continued to emerge until about August 15th. We failed to induce these moths to lay eggs, as noted above. In most localities the insect was not noticed again in 1896, but from two places reports reached us, on September 14th and 29th, of the ravages of armies of worms. These were evidently the offspring of the brood of moths which emerged in the latter part of July and the first week in August. From some of the September armies of the worms, moths emerged in our cages from October 31st until November 18th. November 9th, we saw a pair of moths in copulation, and by the 11th the female had laid many eggs on the grass leaves. By the 20th of the month some of the eggs had hatched ; other eggs hatched as late as the 27th. Ordinarily this would be rather late for the little caterpillars to obtain food, but last year the weather was favorable at that late date and continued so for some time, so that the

worms fed for several days on the grass leaves before the autumn frosts forced them to prepare for hibernation.

The above observations clearly show that at least two broods of army-worms appeared in New York in 1896, one in July and a later one in September. However, across our southern border, in New Jersey, several armies of the worms ravaged crops in May. Although no noticeable injury seems to have been done by the insect last year in New York before July, their appearance in New Jersey in May and our observations on their habits in the fall are quite conclusive evidence that there must have been at least one brood of the caterpillars previous to July in our state.

We are thus led to conclude that three broods of the army-worm ordinarily occur in New York state. The first brood of the caterpillars are doubtless at work in April and in an "army-worm year" may be forced to march in search of new supplies in May in some localities. This May brood of worms transform early in June into the moths which lay the eggs from which hatch the second brood of worms that were so destructive in July last year. Finally, a third brood of caterpillars, the progeny of the moths from the July brood of worms, work in September.

The most destructive brood.—Usually the second or July brood of the army-worms is the destructive one in New York state and similar latitudes. The first or May brood was noticeably destructive in some localities in New Jersey and Illinois, but seems not to have attracted attention by its injuries in New York. Ninety-five per cent or more of the injury done by the army-worm in New York last year was the work of the second or July brood. In at least two localities, however (Cheviot, Columbia Co., and Warwick, Orange Co.) it was only the September or third brood of the worms which did noticeable damage in 1896. Owing to the activity of their enemies and to other causes, rarely is there more than one *injurious* brood of the insect during the year, and as stated above, this is usually the second or July brood. Thus in those localities which suffer from the ravages of either the first (May) or the second (July) brood of the caterpillars, usually no more armies will be seen during the rest of the season. This is a very important phase of the question for upon it may depend the answer to the question so often asked in July last

year: Will it be safe to plow under our ruined crops and attempt to grow a late crop of something? This question is discussed further on.

How the insect passes the winter.—Our observations, detailed above in discussing the number of broods, further confirm previous records of the hibernation of the insect as a caterpillar. The indications are that in the latitude of New York most of the worms that hibernate are small, not more than half grown.

Among the many records of the capture of the moths, there are but two of their appearance in New York state earlier than about the middle of June; one moth was bred at Albany about the middle of May and we captured one at light on June 2d. This would indicate that the insect does not pass the winter as a moth in our latitude. But the moths have been found in New Jersey "during the entire winter in sheltered places" (Rept. of Entomologist of N. J. Expt. Station for 1896, p. 450). Some writers believe that the insect may also winter as a pupa, but no conclusive evidence has yet appeared to prove this.

Thus the army-worm doubtless hibernates in New York state either as a young caterpillar or in the moth stage; possibly some pupæ winter over.

Briefly summarized then the life-history of the army-worm in New York state seems to be as follows: the moths which may hibernate oviposit early and the caterpillars which hatch from these eggs augmented by the somewhat larger ones which were born late the preceding fall and hibernated, form a May brood of worms that may possibly be numerous enough some years to necessitate their marching to new feeding grounds. The caterpillars of this first brood undergo their transformations through the pupa stage to the adult insect or moth early in June; and the progeny of these moths form a second, and often injurious marching brood of the worms in the early part of July. A third brood of the worms, which are rarely injurious, is developed in September, and the moths into which these transform may lay eggs from which will hatch the young caterpillars that hibernate, or some of the moths themselves may hibernate and oviposit in the spring.

THE NEXT ARMY-WORM YEAR.

Will the army-worms come again next year? In 1896, this was the question uppermost in the minds of many New York farmers whether they suffered from the ravages of the insect during the year or not. This spring there are reports from some localities in the state that farmers are planning to not sow oats and other grains for fear of another invasion of the worms this summer. Of course, no one can say definitely when New York crops will again be ravaged by the pest. Many of our insect foes may come one year in very destructive numbers, but it often happens that the next season we see or hear very little of them. The prevalence of insect life may be likened to a pendulum that swings irregularly in response to the action of some of nature's forces; in the case of insects, their parasitic and predaceous enemies and the variation in their food supply and in climatic conditions are among these forces. However, man has not yet been able to formulate these "ups and downs" so that he can rarely predict with any certainty whether an insect will appear in injurious numbers at any time, even though it may have appeared in very destructive numbers only the year before. This is especially true of the army-worm. No one can predict when we will or will not have an "army-worm year." It has been noted that often an outbreak of the worms has occurred during years which had an unusually dry spring and were preceded by an abnormally dry year; a dry spring gives a more favorable opportunity for the development of the little hibernating caterpillars and those which may hatch early from eggs laid by moths which hibernated. But this combination of climatic conditions does not invariably bring army-worms in injurious numbers.

Since 1825, the insect has appeared in injurious numbers somewhere in the country nearly every year. It has also been injurious somewhere in New York state at intervals of from one to three years since 1872. But, and here is an important historical fact, *rarely if ever, has it ravaged crops in the same locality during two years in succession.* There has been only three general outbreaks of the insect in New York; those occurred in 1861, 1875, and 1880. The other outbreaks were mostly confined to a county

or two. Thus from the historical record of the insect, one might justly conclude that 1897 will not be an "army-worm year" either in our state or in the country at large. Doubtless armies of the worms will appear in very limited localities in some parts of the country but quite probably not on the same farms that were ravaged last year.

There are other reasons for thinking that farmers, whose crops suffered last year, need not lose any brain matter in worrying over the possibility of another "army-worm year" in 1897 or for several years to come; in many cases the worms had not been seen on these farms, until last year, since 1861 or 1875. There is no doubt but what another brood of the worms appeared in New York after the very destructive brood which worked in July. But in those localities where the insect was so destructive in July, apparently nothing was seen of the caterpillars of the next brood which worked in September; they were not numerous enough to attract attention by their injuries. There must have been a fearful decimation among the many millions of worms constituting the July armies either about the time they became full grown or when they had reached the next or pupa stage. And there was. If there had not been, at the normal rate of multiplication, there would have been enough caterpillars developed in September to have caused the ravages of the July brood to have appeared insignificant in comparison. The principal causes of this great decimation in the ranks of these armies of worms are discussed under the natural enemies of the insect. Suffice it is to say here, that as some of the same causes worked upon the September brood, we believe that the number of army-worms which went into hibernation last fall in New York state was not materially greater than in other years when nothing is heard of the insect the year following.

In short, we believe that the history of the insect and the evident and very effective work of its enemies last year, in New York at least, strongly indicate that the army-worm will be a scarce article of diet for the birds in 1897 and for some years to come in most parts of our state. At any rate, we would strongly advise farmers to not hesitate a moment about sowing grain crops

for fear of the worms either in 1897, 1898, or for the next decade, for that matter.

USES THAT MAY BE MADE OF INFESTED FIELDS.

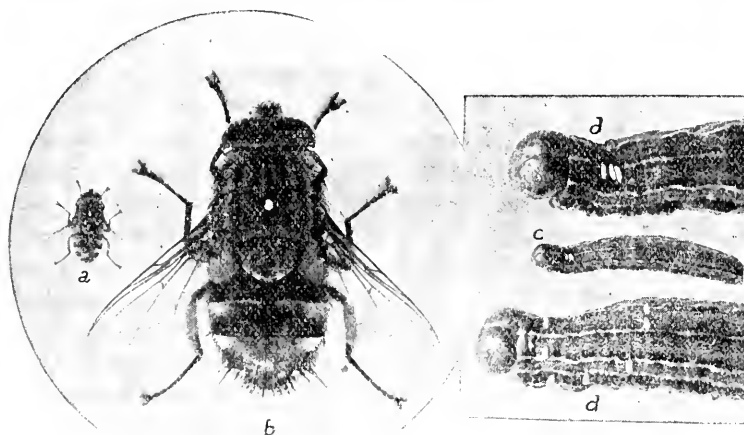
Last year many farmers were at a loss to know what use to make of a crop that had been invaded by an army of the worms whose ravages it was then impossible to check. Those who cut their oats and "shocked" them in the usual manner, hoping that this would check the work of the pest, were doomed to disappointment for the worms continued to work in the shocks, doing much damage. Infested crops of oats and other grains may be cut, and made into hay, or put into silos. This procedure will not facilitate the further multiplication of the insect any more than if the crops were not harvested. What few worms are made into hay or go into the silo will not deleteriously affect the hay or silage.

In many localities in New York state, the great destruction wrought by the worms resulted in a decided shortage of fodder for stock for the fall and winter. Hence, many inquired in July last year what crops, if any, could be grown on the same fields that year. In many cases a shortage of this kind may be partially overcome by putting in at once crops of millet, Hungarian grass, or turnips. Sow from 3 pecks to a bushel of the first two, and about 5 pounds of the latter per acre. If the infested field is plowed, well fitted, lightly harrowed and rolled, and treated to a dressing of fertilizer containing a relatively high per cent. of potash and nitrogen, good crops of these stock foods may be obtained before the winter. Should the turnips be too thick, cultivate by harrowing one or more times soon after they come up. Oats and peas mixed and treated in like manner may also succeed. As the September brood of the worms is rarely numerous enough to be destructive in our state, crops sown in the latter part of July or in August will rarely suffer from the army-worm.

NATURAL ENEMIES.

What a feast many of the birds, including chickens and turkeys, had last year in those localities where the army-worm was numerous. On July 23d, Mr. L. T. Yeomans, of Walworth, N. Y., wrote

us: "We think we have disposed of the greater share of our army-worms. The birds were our greatest helpers. They came in flocks—blackbirds, thrushes, and even the English sparrow condescended to help." Mr. F. A. Sirrine, of the New York Experiment Station staff, has reported that in addition to the birds just mentioned, the cowbird, catbird, robin and the lark were seen feeding on the worms at Washingtonville, N. Y. He states:



72.—THE FARMER'S FRIEND. *The red-tailed tachina fly (Winthemia punctulata)*. a, the fly, natural size; b, the fly, much enlarged; c, army-worm upon which the fly has laid eggs, natural size; d, parasitized army-worms, enlarged.

"It was at first doubted whether the sparrows were in the oat field on a legitimate errand, but close observation showed that each old bird was carrying from one to four worms to its young." After an army's onward march has been checked by the measures discussed under the next heading, then turn in all the chickens and turkeys in the neighborhood.

Among the other vertebrate animals, hogs, toads, and frogs often come in for their share of this dainty food.

Army-worms are also preyed upon by many different kinds of insects. A large number of predaceous beetles (including in many cases their grubs also) often gather about an infested field and greedily feed upon the worms.

An unusually large number of true parasitic insects attack the

army-worm, and they are the most destructive of its natural enemies.

Wherever the worms abound or are on the march, they are usually accompanied by two-winged flies (one is shown natural size at *a*, figure 72), which are often so numerous that their buzzing reminds one of that of a swarm of bees.* These tachina flies are usually the most important and effective of the enemies of the army-worm. A careful examination of a hundred worms in almost every army that ravaged crops in our state last year would have revealed the fact that from ten to seventy-five, or even more in some cases, of them bore upon their backs near the head small white eggs stuck fast to the skin. At *c*, figure 72 is shown a caterpillar bearing three of these eggs natural size; the same eggs are shown enlarged, in position, at *d*, above *c*, and another worm bearing seven similar eggs at *d* below *c*. As many as eighteen of these eggs have been found on a single army-worm, but five is about the usual number. These eggs are stuck to the caterpillar's skin by the tachina flies which buzz around a worm until a favorable opportunity occurs when they swoop down and quickly stick on an egg. Doubtless the eggs are placed near the head to prevent the worm from getting at them with its jaws. From these eggs there soon hatches a maggot which bores its way through the caterpillar's skin and then revels in the juices and fatty tissues of the body, gradually sapping the life of the worm. But few of the army-worms which bear these tell-tale marks—the eggs—of

* Two species of these flies were apparently about equally numerous in infested fields in New York last year. One species, the red tailed tachina fly (*Winthemia 4-pustulata* Fabr.), is shown natural size at *a*, and much enlarged at *b* in figure 72. It was first described in this country by Kirkpatrick in 1860, but Mr. D. W. Coquillett has recently stated that it is an European species and was described by Frabricius in the last century. Mr. Coquillett sends us the following synonyms for this insect: *Exorista leucaniae* Kirk.; *Senomctopia militaris* Walsh; *Exorista cecropiae* Riley, M. S.; *Tachina deilephila* O. S.; *Exorista infesta* Williston; *Chaetolyga rufonotata* Bigot; *Chaetolyga rufopicta* Bigot; *Exorista ciliata* Townsend; *Exorista platysamiæ* Townsend; *Exorista datanae* Townsend.

The other species closely resembles the one just discussed and is known as the yellow-tailed tachina fly (*Belvosia unifasciata* Desv.). It was first described as *Exorista flavicausa* by Riley, but Mr. Coquillett has recently found that Riley's type is the same insect as *B. unifasciata* Desv.

these little parasitic flies, ever succeed in reaching the pupa stage; usually the maggots of the parasites get full grown and leave the caterpillar's body about the time it is also full-grown. The maggots burrow into the ground beneath their host's body and in a few days undergo their transformations to the adult fly.

The deadly work of these tachina flies, of course, does not culminate until the worms have done about all of their damage, but the further development of the insect is stopped and thus the danger of another brood of army-worms is averted. New York farmers were greatly indebted to these little tachina flies last year, or so effectively did they work on the July brood of worms that we believe the comparative insignificance in the numbers of the September brood was largely due to the efforts of the little flies in July. In other words, had it not been for the work of these flies in July, we believe many New York farmers would have suffered from similar armies of the caterpillars in September.

The question has been asked: What do these tachina flies feed upon when the crop of army-worms is comparatively insignificant? The yellow-tailed tachina fly seems to have been bred only from the army-worm, but the red-tailed species is known to work upon at least thirteen other kinds of caterpillars.* Doubtless the former species also has other hosts, and thus when there is a shortage in the army-worm crop, these tachina flies have other choice delicacies in the worm line that may be substituted in their menu.

There are several species of minute four-winged flies which are also parasitic upon the army-worm. The flies "sting" their eggs through the caterpillar's skin, and the grubs that hatch live within the body of their host; when they issue, they spin small, oval, white, silken cocoons attached by loose silk to some neighboring object. As many as ninety-six of the grubs may find

* Dr. L. O. Howard writes that this tachina fly has the following hosts: *Deilephila lineata* Fabr.; *Protoparce carolina* Linn.; *Philampelus pandorus* Hueb.; *Alypia 8-maculata* Hueb.; *Attacus promethea* Drury.; *Attacus cecropia* Linn.; *Orgyia leucostigma* S. and A.; *Datana ministra* Drury.; *Adoneta spinuloides* H. S.; *Peridroma saucia* Hueb.; *Feltia herilis* Grote; *Leucania unipuncta* Haw.; *Laphygma frugiperda* S. and A.; *Hemaris diffinis* Boiscl.

sustenance in a single army-worm. Sometimes these little parasites are so numerous as to be of much help in checking the pest. Some of the large ichneumon flies also attack the army-worm.*

Last year, in some parts of the state, thousands of the army-worms and many more of their pupæ were killed by a bacterial disease, sort of an insect cholera ; the interior of worms and pupæ affected with this disease appeared rotten.

HOW TO FIGHT THE ARMY-WORM.

As army-worms are not easily and not often discovered in the comparatively limited area in which a whole army of them may breed, a farmer's crop of many acres may be thoroughly infested with a ravenous army before he is aware of it. Where the worms have thus taken possession of a field, but little can be done to destroy them which will not also involve the destruction of the crop. If the surface of the soil were smooth and hard enough, the drawing of a heavy roller over the field would crush many of the worms, but this "roller process" is not often nearly so effectual as it would seem to be theoretically. A flock of poultry turned into the field would lessen the numbers of the worms somewhat.

However, the worms can be prevented from entering other fields, and may, in many cases, be checked and killed even after they have entered a new field ; in some cases, especially in corn fields, an advancing army may be stopped in the middle of the field and thus half of the crop saved. The simplest and most effectual method of doing this is to either dig a smooth-walled ditch, or plow several deep parallel furrows in front of the invading army ; the perpendicular, smooth side of the plowed furrow should be towards the field to be protected. The worms not being readily able to scale the perpendicular wall of the ditch or furrow will drop back and begin crawling along the bottom seeking an easier place of ascent. If deep holes have been dug in the ditch or furrow at intervals of a few feet, the worms,

* We bred several specimens of *Meteorus hyphantriae* Riley from army-worms. This insect and its curious suspended cocoons were illustrated on plate IV, *a*, *b*, *c*, of bulletin 123.

in their wanderings, readily tumble into these holes and cannot get out. Bushels of them have been trapped in this way, and then killed with a little kerosene or by burning some straw scattered along the furrow. The holes or pits in the furrows are very essential to the success of this preventive method. It has been aptly said : " To one who has never before seen the army-worm in its might, the sight of the myriads as they returned thwarted in their endeavors to cross a ditch or furrow, or of the living, moving, and twisting mass which sometimes fills a ditch to the depth of several inches, it is truly interesting." In some soils a little extra work will be necessary to keep one side of the furrow perpendicular and to keep the earth loose and friable in the furrow ; some accomplish the latter by dragging brush along the furrow. A ditch or several furrows well taken care of in this way will afford an almost impassable barrier to the worms, as many, who followed the directions carefully last year, can testify. It is such an easy matter to make a furrow and as one is not so effectual a barrier as a ditch, we advise that two or more parallel furrows be made, so that the worms which may scale the first one will be confronted by another.

A strip of coal tar will effectually stop the worms as long as it remains sticky, but it has to be renewed once or twice a day and is thus expensive. There were some reports that the worms would not cross a strip of salt, and that when sprinkled with salt they die. Mr. Wm. R. Huntington, Rome, N. Y., reported to us the following experiment with salt : " After hearing that salt would kill them, I took a pailful and went into a corn field where there were lots of worms. I found some on the ground and put salt all around them and on them. They would curl up and after a short time, a minute or two, would crawl away as lively as ever. I next went to some hills of corn that were badly eaten and covered with worms. I put at least a handful of salt on a number of such stalks, covering up many of the worms, but I could not see that it had any effect upon them. The next day I found the same worms, apparently, eating close to the salt. I had already put a ditch around this piece which held them where they were, so I did not experiment any farther with salt, not having any faith in it." Whenever practicable, it is always a good plan to make a

ditch or furrows around the whole field or the worst infested section of the field and thus confine the worms as Mr. Huntington did. Then turn in your poultry or poison the worms. Our little parasitic friends often do noble work in checking the future development of the insect, but they do not give the immediate relief which the farmer usually needs.

When the worms can be confined to a small area by a ditch, it may be practicable to spray this area with a strong Paris green mixture to poison the worms. Sometimes much can be done to lessen their numbers by drenching with Paris green a narrow strip of the crop on the side toward which the army of the worms are marching, or even a strip just ahead of the worms in an infested field. A bran mash, to which enough Paris green has been added to give it a distinct greenish tinge, scattered about where the worms are at work will attract and poison many of them.

In fighting army-worms, it is necessary to act quickly, for a day's delay often means the destruction of an acre or more of a promising rye, corn, oat, or hay crop. Stop the onward progress of the worms, or confine them in a limited area if practicable, with ditches or deep furrows in which holes have been dug every 10 or 15 feet. Then kill as many of the worms as possible, either in the holes in the furrows, or by the use of poisons, or invite the poultry to a feast.

MARK VERNON SLINGERLAND.

Bulletin 134.

April, 1897.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

HORTICULTURAL DIVISION.

Strawberries under Glass.



By C. E. HUNN and L. H. BAILEY.

**PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.**

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
E. A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums for western New York.
132. Notes upon Celery.
133. The Army-worm in New York.
134. Strawberries under Glass.

CORNELL UNIVERSITY, ITHACA, N. Y., }
April 23, 1897.

HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY :

Sir: The ensuing paper is submitted for publication under Chap. 437 of the Laws of 1896.

The bulletins which have been issued under the Experiment Station Extension Bill have been of four general types,—those which have attempted to improve the cultivation of staple or well known crops, which have endeavored to interest the farmer in the amenities of rural life (as the flower and tree-planting bulletins), those which aim to expound well known facts and principles, and those, like the present, which suggest new avenues of profit. There of are, of course, no hard and fast lines dividing these classes of bulletins, and it is hoped that the total effect of them has been educative. The writer will be glad if they have opened new and pleasant lines of thought to the dweller in the country, and have thereby given him any new incentives to live and work.

Several years ago, the writer undertook the investigation of the winter forcing of vegetables, and whilst that type of experiment is not to be discontinued, it is nevertheless to form a very subsidiary part of the work in the next few years. That ground has been fairly well traversed. He now drops the Experiment Station Extension work by suggesting a new field of experiment,—the winter forcing of fruits.

L. H. BAILEY.



73.—Bench of Beder Wood strawberries, in 6-inch pols. Berries supported by sections of wire screen. See, also, the picture on the title-page.

STRAWBERRIES UNDER GLASS.

During the past winter we made an attempt upon a considerable scale to grow strawberries under glass. The attempt was so successful that the methods which were employed in the raising of the crop are here detailed. The experiment was made under difficulties from the fact that we have no house especially adapted to the purpose, the climate of Ithaca is excessively cloudy,* and we also had no well-established strawberry plants of the varieties which we desired from which young plants could be raised. Consequently the berries were grown in two houses which were too high and rather too dark for their best development; and the plants were taken from stock which was set late in the spring of 1896. It is probable that best results are to be secured from runners of maiden plants which are set very early in the spring or in the fall before.

The stock plants from which runners were taken were set on the 6th of May in rich and mellow ground, but the season turned out to be very dry and the plants made less growth than they would have made in a normal season. Three lots of plants were grown from this stock, as follows: The first lot was grown in 2½ inch pots plunged under the runners on July 10th; the second lot was from pots plunged on July 27th; and the third from those plunged on August 22d. After having grown in these pots for a period of about two weeks, the plants were taken up and shifted into 4-inch pots and were then put in frames. The frames which we used for this purpose were simply common cold-frames, upon which no glass was placed until very cold weather came on.

The first lot of plants was taken to the frames on the 24th of July; the second upon the 21st of August; and the third lot upon the 11th of September. The plants were shifted again into 5-inch and finally into 6-inch pots, and in the latter size they were

* From December 1st to February 1st there was not a full day of clear sunshine.

brought into the forcing-houses and carried through to fruiting. The first lot was shifted from fours to fives on the 8th of September, and from fives to sixes on the 26th of September; and the other lots received similar treatment.

• The plants were allowed to remain out of doors until nearly mid-winter, with no more protection than a covering of glass during the very coldest times. It was the desire to give them a very thorough rest by allowing them to freeze perfectly solid. We are not at all sure that this freezing is essential. In fact, the probability is that berries can be raised about as well without it; but it is very probable that a decided check or rest to the plants before they are taken to the houses will add greatly to their productiveness and strength, and freezing may be expected to destroy red spider and other pests.

On the 28th of December, 450 pots of the first lot were brought into a house which had a temperature of 40 to 45 degrees at night. All dead and diseased leaves were trimmed away. On the 6th of January, the young leaves had begun to appear freely and now and then there appeared a spot of the rust. They were then thoroughly sprayed with the ammoniacal carbonate of copper and after that time the disease made no trouble. The house was vaporized at frequent intervals with the Rose Leaf extract of tobacco in order to keep down insects.

Many flowers were open on the first of February. On the 9th, the pots were transferred to a warm house (temperature of 65 degrees at night), and the plants were staged near the glass, and were allowed to remain until the fruit was off (Fig. 73).

Upon the 6th of March, the berries were well colored, and the first picking was made on the 11th, when they sold in Ithaca for \$2 per quart. The crop continued for about ten days.

The Beder Wood comprised the greater part of the pots of this first lot. They came into bloom when the foliage was still very small and scant, and we were fearful that there would not be foliage enough to carry the plants to maturity; but this fear proved to be groundless. It was observed that when the weather was very cloudy and damp, the stamens did not develop strongly and there was much difficulty in getting sufficient pollen to pollinate the flowers. The Beder Wood is a perfect-flowered berry, but we

found that it produced only sufficient pollen for itself. This pollen was transferred upon every bright day by means of a brush. A soft brush was rubbed over the anthers and the pollen thereby taken off, and then the brush was rubbed over the pistils (or the center of the flower). The operator always carried with him a little spoon-like implement, which is made by gluing a watch-crystal upon the end of a small ladle,* and whenever any flower contained a superabundance of pollen, the dust was shaken into this receptacle and used for those flowers in which the pollen was deficient. A common spoon would answer this purpose very well. It is necessary to repeat the pollinating every pleasant day. As in the case of tomatoes and other hot-house plants, the pollen is discharged most freely when the sun is warm and bright and when the house is dry. It is very essential that pains be taken to completely pollinate every flower, for if one side of the head of pistils is left unfertilized, that side of the berry will fail to develop and a nubbin will be the result.

Upon the 19th of February, when the berries were well set, liquid manure was first given to the plants; and the application was repeated twice a week until the berries were about full grown.

It is necessary to devise some means to hold the berries up from the earth or the pot, otherwise they are likely to decay in the humid atmosphere of the house, and they become soiled in watering. Our first effort was to cover the tops of the pots with sphagnum moss, but two or three days of dull wet weather brought on indications of the rot, and the moss was quickly removed. Some of the pots were then covered with cork dust, such as is used in the packing of foreign grapes, and this answered the purpose most admirably; but it is not always handy to get and it is some trouble to apply it and to keep it clean. The next attempt was the use of small pieces of fine wire screen, such as is shown in the illustrations, and this was a most admirable success. It kept the berries away from the earth and showed them off to the very best advantage. Forked sticks are sometimes used for this purpose.

The second lot of plants was brought in from the frames upon the 4th of February and placed upon a work-room floor where

* Figured in "The Forcing Book," Fig. 53.

the pots could gradually thaw out. Upon the 9th, they were placed upon the benches in a house with a temperature of 40-45 degrees at night, and thereafter they were treated in the same manner as those in the first lot. The third lot was handled in essentially the same way. In the second and third lots were a number of other varieties, of which the Sharpless and Van Deman were the most prominent. There were also a few Hunn. The best results were obtained with the Beder Wood, and this is the variety which is shown in Fig. 73 and also upon the title-page. One of its strong peculiarities is the comparatively small amount of foliage which it bears and the consequent greater prominence of the fruit. Its chief drawback is the light color of the berries. In respect to color, the Van Deman is somewhat better, but the habit of the plant is more tall and less attractive; and although it is a perfect-flowered berry, we had difficulty in securing enough pollen to fertilize it. Its great merit for a forcing berry is its earliness. Sharpless is about ten days later than Van Deman, and Hunn is at least two weeks later. This last is the handsomest berry which we have had in the house, being very large and exceedingly dark colored; but it is much too late to be profitable for forcing.

The first crop of Beder Wood averaged six first-class and uniform fruits to a plant in the whole lot of over four hundred pots. The plants set from eight to twelve berries each, but the small and imperfect ones were cut off and the limit was fixed, at about eight fruits. We are now convinced that if we could have had stronger plants to start with, and with the experience of the present winter, we could average eight fruits to the plant. At this writing (April 23), the Beder Woods of the third lot are setting their fruits freely and no hand pollination is given them. The workman simply brushes his arm over the plants whenever he passes along, and the pollen seems to have disseminated itself freely. At this time of the year, however, the houses are open and dry so that the pollen is discharged much more freely than it is in the winter time.

Because the pots are set so close together in the house, it is possible to secure a larger yield per square foot under glass than is obtained in the field. In our experience, eight to twelve pots

give a quart of berries. That is, a quart is obtained from two to three square feet of floor space. Allowing for walks and unavoidable waste space, the yield would still figure up fully 400 bushels to the acre.

In regard to the demand for house-grown strawberries, we can give very little information. It is the province of an Experiment Station to determine how plants may be grown rather than to determine how they may be sold. In the larger cities, however, there is always a limited but brisk demand at high prices for winter-grown berries. The price ranges from four to even five dollars a quart down to two dollars and a dollar and a half. A well-grown pot of strawberries is one of the most interesting plants for table decoration and there is a considerable market for the plants in this condition. Late in April we saw six-inch pots of strawberries upon sale in a small city market for fifty cents each, none of which bore more than two or three ripe fruits, and even those were of very indifferent quality. With pots bearing from six to eight large and evenly ripened fruits, there should be no difficulty in realizing from one to two dollars a pot. The following note from *Garden and Forest* will bear out this statement:*

“Pots of fruiting strawberry plants were an attractive Easter specialty in a fruiterer’s window on Broadway last week. The foliage was fresh and luxuriant, with three or four large highly colored ripe berries and a few immature ones. The plants sold for \$1.50 to \$2.50 each.”

In all our experience in the growing of plants, we have never aroused so much enthusiasm from plant lovers as with the strawberries; and it is difficult to conceive how any object can be better suited to the finest table decoration than a clean pot with a thrifty and well formed strawberry plant bearing six to eight full ripe berries and a few blossoms.

Some of the points in the cultivation of strawberries under glass which appeal to us with especial force are these:

1. Very strong plants to begin with, which have been kept in vigorous growth, and not allowed to become pot-bound until they have reached six-inch pots.

* *Garden and Forest*, x. 160 (April 21, 1897).

2. Varieties which are early, or at least not later than mid-season, and preferably those which themselves produce an abundance of pollen.

3. The exercise of great care to have the plants free of fungous diseases and insects before they are put upon the benches.

4. The devoting of an entire house to the crop. If two or three different crops are grown in the same house, none of them can receive the very best treatment which they demand; and if there are other plants in the house which are infested with red spider, the pests will spread to the strawberries and it is very difficult to dislodge them without keeping the plants so wet that pollination is interfered with and rot threatened.

5. Growing the plants as close to the glass as possible.

6. In the dull months, constant and careful attention to hand pollination.

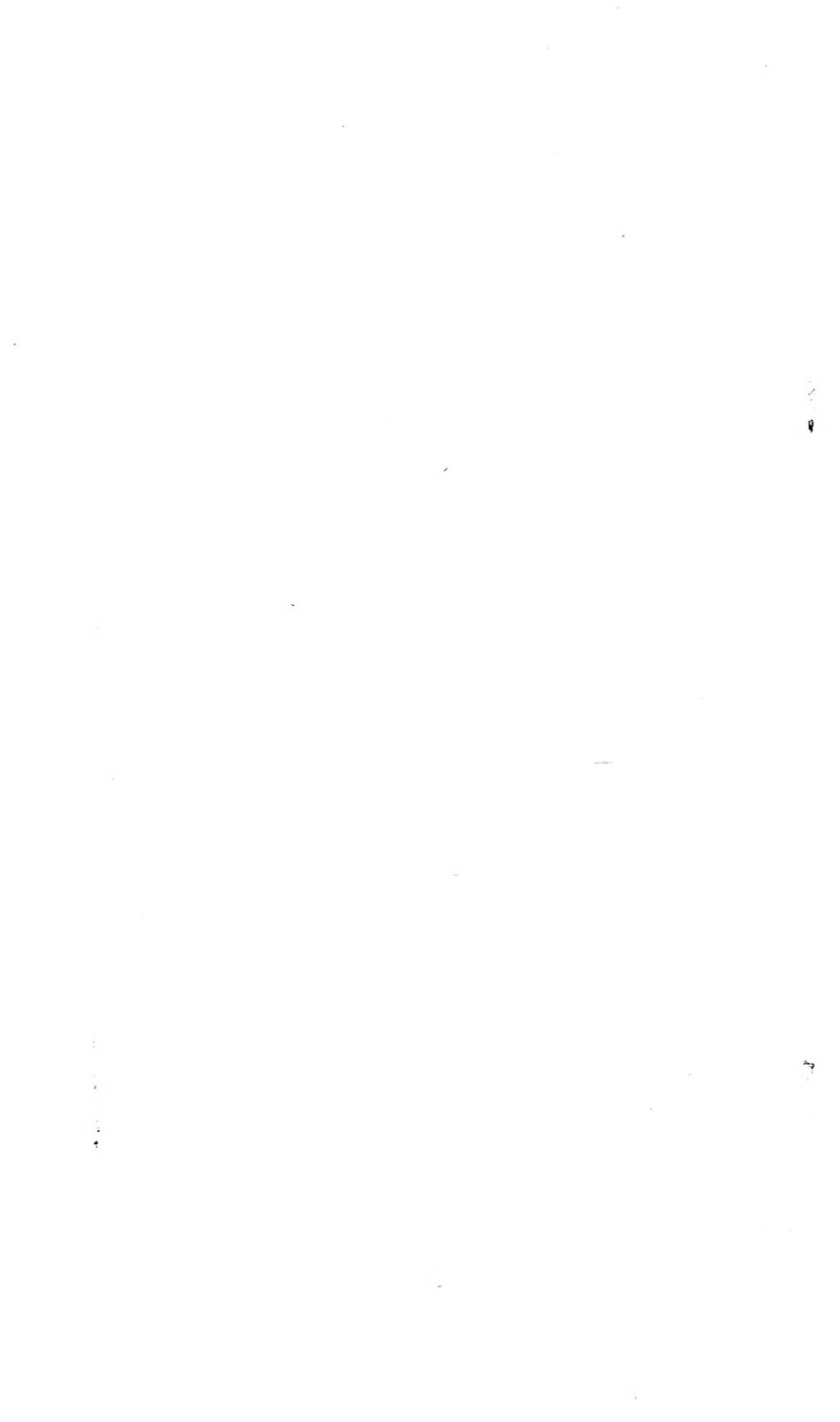
7. Liberal applications of liquid manure two or three times a week after the fruits have begun to swell.

8. Exercise of care that the berries do not lie directly upon the soil or upon a wet surface.

We are by no means confident that we have found the best methods of forcing strawberries. We give our experience for what it is worth, and desire to correspond with persons who can help us to better results.

C. E. HUNN.

L. H. BAILEY.



Bulletins of Cornell University Agricultural Experiment Station,

1888 to Aug. 1, 1897.

<p>* 1 Experimental Dairy House</p> <p>* 2 Feeding Lambs for Fat and Lean</p> <p>* 3 Insectory of Cornell Univ. Wireworms</p> <p>* 4 Growing Corn for Fodder and Ensilage</p> <p>* 5 Lean Meat in Mature Animals</p> <p>* 6 Fodders and Feeding Stuffs</p> <p>* 7 Influences Affecting Sprouting of Seeds</p> <p>* 8 Different Rations for Fattening Lambs</p> <p>* 9 Windbreaks in their Relation to Fruit</p> <p>* 10 Tomatoes</p> <p>* 11 Saw Fly Borer in Wheat</p> <p>* 12 Apparatus for Drying in Hydrogen and Ex. Fat</p> <p>* 13 Leaching of Farm-yard Manure</p> <p>* 14 Strawberry Leaf Blight</p> <p>* 15 Sundry Investigations of 1889</p> <p>* 16 Growing Corn for Fodder and Ensilage</p> <p>* 17 Cochran's Method for Testing Milk</p> <p>* 18 Experiences in Spraying</p> <p>* 19 Condition of Fruit Growing West. N. Y.</p> <p>* 20 Cream Raising by Dilution</p> <p>* 21 Tomatoes</p> <p>* 22 Grain for Cows at Pasture</p> <p>* 23 Insects Injurious to Fruits</p> <p>* 24 Clover Rust</p> <p>* 25 Sundry Investigations of 1890</p> <p>* 26 Egg Plants</p> <p>* 27 Farm Manures</p> <p>* 28 Forcing Tomatoes</p> <p>* 29 Cream Raising by Dilution</p> <p>* 30 Influence of Electric Light on Green-house Plants</p> <p>* 31 Forcing English Cucumbers</p> <p>* 32 Tomatoes</p> <p>* 33 Wireworms</p> <p>* 34 Dewberries</p> <p>* 35 Combination of Fungicides and Insecticides</p> <p>* 36 Grain for Cows at Pasture</p> <p>* 37 Sundry Investigations of 1891</p> <p>* 38 Native Plums and Cherries</p> <p>* 39 Creaming and Aerating Milk</p> <p>* 40 Removing Tassels from Corn</p> <p>* 41 Steam and Hot Water for Heating Greenhouse</p> <p>* 42 Electro Horticulture</p> <p>* 43 Trouble of Winter Tomatoes</p> <p>* 44 Pear Tree Psylla</p> <p>* 45 Tomatoes</p> <p>* 46 Mulberries</p> <p>* 47 Feeding Lambs and Pigs</p> <p>* 48 Spraying Apple Orchards</p> <p>* 49 Sundry Investigations of 1892</p> <p>* 50 The Bud Moth</p> <p>* 51 Four New Types of Fruit</p> <p>* 52 Cost of Milk Production</p> <p>* 53 Edema of the Tomato</p> <p>* 54 Dehorning</p> <p>* 55 Greenhouse Notes</p> <p>* 56 The Production of Manure</p> <p>* 57 Raspberries and Blackberries</p> <p>* 58 Four-Lined Leaf-Bug</p> <p>* 59 Does Mulching Retard Maturity of Fruits</p> <p>* 60 The Spraying of Orchards</p> <p>* 61 Sundry Investigations of the Year</p> <p>* 62 The Japanese Plums in North America</p> <p>* 63 Coöperative Test of Sugar Beets</p> <p>* 64 On Certain Grass-Eating Insects</p> <p>* 65 Tuberculosis in Relation to Animal Industry</p> <p>* 66 Test of Cream Separators</p> <p>* 67 Some Recent Chinese Vegetables</p> <p>* 68 The Cultivated Poplars</p> <p>* 69 Hints on the Planting of Orchards</p> <p>* 70 The Native Dwarf Cherries</p>	<p>71 Apricot Growing in Western New York</p> <p>72 The Cultivation of Orchards</p> <p>73 Leaf Curl and Plum Pockets</p> <p>74 Impressions of the Peach Industry in N. Y.</p> <p>75 Peach Yellows</p> <p>76 Some Grape Troubles in Western N. Y.</p> <p>77 The Grafting of Grapes</p> <p>78 The Cabbage Root Maggot</p> <p>79 Varieties of Strawberry Leaf Blight</p> <p>80 The Quince in Western N. Y.</p> <p>81 Black Knot of Plums and Cherries</p> <p>82 Experiments with Tuberculin</p> <p>83 A Plum Scab in Western N. Y.</p> <p>84 The Recent Apple Failures in N. Y.</p> <p>* 85 Whey Butter</p> <p>86 Spraying of Orchards</p> <p>87 Dwarf Lima Beans</p> <p>88 Early Lamb Raising</p> <p>* 89 Feeding Pigs</p> <p>90 The China Aster</p> <p>91 Recent Chrysanthemums</p> <p>92 Feeding Fat to Cows</p> <p>93 Cigar-Case-Bearer</p> <p>* 94 Damping Off</p> <p>95 Winter Muskmelons</p> <p>96 Forcing House Miscellanies</p> <p>97 Entomogenous Fungi</p> <p>98 Cherries</p> <p>99 Blackberries</p> <p>100 Evaporated Raspberries in New York</p> <p>101 The Spraying of Trees and the Canker Worm</p> <p>102 General Observations in Care of Fruit Trees</p> <p>103 Soil Depletion in Respect to Care of Fruit Trees</p> <p>104 Climbing Cutworms in Western N. Y.</p> <p>105 Test of Cream Separators</p> <p>106 Revised Opinions of the Japanese Plums</p> <p>107 Wireworms and the Bud Moth</p> <p>108 The Psylla and N. Y. Plum Scale</p> <p>109 Geological History of the Chautauqua Grape Belt</p> <p>110 Extension Work in Horticulture</p> <p>111 Sweet Peas</p> <p>112 The 1895 Chrysanthemums</p> <p>113 Diseases of the Potato</p> <p>114 Spraying Calendar</p> <p>115 The Pole Lima Beans</p> <p>116 Dwarf Apples</p> <p>117 Fruit Brevities</p> <p>118 Food Preservatives and Butter Increasers</p> <p>119 Texture of the Soil</p> <p>120 Moisture of the Soil and Its Conservation</p> <p>121 Suggestions for Planting Shrubbery</p> <p>122 Second Report upon Extension Work in Horticulture</p> <p>123 Green Fruit Worms</p> <p>124 The Pistol-Case-Bearer in Western N. Y.</p> <p>125 A Disease of Currant Canes</p> <p>126 The Currant Stem Girdler and the Raspberry-Cane Maggot</p> <p>127 A Second Account of Sweet Peas</p> <p>128 A Talk About Dahlias</p> <p>129 How to Conduct Field Experiments with Fertilizers</p> <p>130 Potato Culture</p> <p>131 Notes upon Plums</p> <p>132 Notes upon Celery</p> <p>133 The Army-worm in New York</p> <p>134 Strawberries under Glass</p> <p>135 Forage Crops</p> <p>136 Chrysanthemums</p> <p>137 Agricultural Extension Work, sketch of its Origin and Progress</p>
--	--

* Out of Print.

Bulletin 135.

May, 1897.

Cornell University Agricultural Experiment Station,

ITHACA, N. Y.

AGRICULTURAL DIVISION.

Forage Crops.



By I. P. ROBERTS and L. A. CLINTON.

PUBLISHED BY THE UNIVERSITY,

ITHACA, N. Y.

1897

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
EDWARD A. BUTLER,	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	-	Agriculture.
B. M. DUGGAR,	-	-	-	-	-	Cryptogamic Botany.
A. L. KNISELY,	-	-	-	-	-	Chemistry.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in Western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and the Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums for Western New York.
132. Notes upon Celery.
133. The Army-worm in New York.
134. Strawberries under Glass.
135. Forage Crops.

FORAGE CROPS.

There has within recent years been an increasing demand for information concerning forage crops. With many, meadows and pastures have proven insufficient to meet the demands made upon them and it has become a serious question as to the best manner for supplying the deficiency. The causes of the deficiency are various and far reaching but the results are the same. Especially in the dairy sections has the failure been most keenly felt and there has arisen a demand for information concerning forage and soiling crops.

Many successful farmers of the state who have practiced soiling, the growing of crops to be cut and fed green, have found the plan more satisfactory than depending entirely upon pastures, and the soiling system with them has become firmly established. Much of the land which has for years been devoted to permanent pasture or permanent meadow has ceased to be profitably productive, and where the tillage of such lands is practicable, ordinarily better returns would be secured were they devoted to the production of special forage crops. Short rotations and intensive agriculture must largely take the place of the permanent meadows and pastures where the land has been allowed to remain in sod year after year until the moss and the daisies have so taken possession that the fields looks more like huge flower beds than grass plats. Hardly a summer passes during which droughts more or less severe are not experienced. The effect of these droughts is always seen most quickly on the meadows and pastures and when this is observed there should be immediately available some forage crop which can be drawn upon to tide the stock over the dry time and give the pastures opportunity to recover. This is especially important in the dairy sections of the state where the milk supply should be kept up, no matter what the conditions of the weather. For the past few years the horn fly has been such a pest at times that some have adopted the practice of blanketing their cows to protect them

from the ravages of the fly. Unless protected in some way cows frequently fall off in milk production from fifty to seventy-five per cent. It is not only humane, but it is a wise financial policy to keep the cows stabled at least a portion of the day where it is shaded and cool, that they may be fed upon some freshly cut succulent forage provided for the purpose. Where cared for in this way they will usually respond abundantly and repay the extra labor involved.

That farm practice which necessitates that well bred animals designed for the production of milk should be compelled to work ten hours a day in order to get from the meagre pastures enough for a mere subsistence is radically wrong. A far better plan is to provide green forage so that during the hottest days the feeding may be done, at least in part, where the animals can eat with some degree of comfort and not be required to expend their energy in fighting the flies or in roaming over brown and parched pastures seeking for that green morsel which is not there and which the thoughtless owner has failed to provide.

Those crops which have proven themselves with us most successful as producers of forage are

Corn. .
Oats and peas.
Oats.
Barley and oats.
Rye.
Barley.
Millets and Hungarian.

From the fact that so many queries are being constantly received with reference to the production of forage it has been thought wise to go somewhat into detail with the hope that the information given might prove of value.

CORN AS A FORAGE CROP.

Where corn can be successfully grown it stands preëminent as a producer of forage and should have a prominent place in the rotation on every stock farm. Though some of the other crops mentioned later may serve better for early forage, yet for late summer or fall there is no crop which can compare with corn either in

amount of produce or feeding value. By the introduction of the silo it is now possible to produce milk as cheap or cheaper during the winter than during the summer. By the more general use of forage and soiling crops it will be possible to lessen materially the cost of production of milk in summer. Though corn is one of the most common of our farm crops, yet there are some facts with reference to its nature and production about which it may be well to speak somewhat in detail.

History of the Plant.

Corn is a sub-tropical plant and is supposed to have had its origin in Mexico. It loves a warm summer climate and a warm porous soil and grows to perfection only in the presence of sunlight and warmth. Corn is the richest gift of the new world to mankind, and even with the adverse conditions under which it is so often raised its value in America far exceeds that of any other crop grown.

Soil for Corn.

Owing to the sub-tropical nature of the plant, that soil is best suited for the growth of corn which is well drained, loose and fairly porous but not leachy. A loamy soil with a clay subsoil presents almost ideal conditions. The plowing should be so done that the soil is well pulverized and the furrow slice left somewhat on edge, not completely inverted. Where sod land is plowed the jointer attachment should always be used that the tenacity of the sod may be broken up. The placing of the furrow upon edge and allowing it to remain for a few days before harrowing down gives chance for aeration and warming, both of which are prime requisites for success in corn raising. While a fairly fine seed bed is important, yet only so much harrowing as is necessary to produce it should be given. In fitting the land for wheat the sub-surface soil may be somewhat firmly compacted. A firm, compact sub-surface soil and a loose surface mulch present the ideal conditions for wheat, and the tramping and packing of the horses feet may do as much or more good than the harrowing. But with corn different soil conditions are required, and unless necessary in order to improve the texture of the soil, the fitting should be somewhat superficial, for if much harrowing be done, this, with

the packing which the soil must receive in after tillage, will so compact the sub-surface soil that harmful conditions will be produced.

Planting of Corn for Forage and the Silo.

When the silo first came into general use it was believed that the corn with which to fill it should be planted thickly either in hills or drills and that the quality of the produce was in no way depreciated in value by being grown thickly. A too common practice now is to raise sowed corn, the claim being that it produces a larger amount of forage per acre and that though planted so thickly that no ears can form and mature, yet the valuable food constituents which would go into the ears if formed, in this case go into the stalks. Some of the most observing farmers have noticed that sowed corn is quickly affected by drought, that before growth is half complete the lower leaves are usually parched and burned. There are so many plants growing on the soil that the moisture supply is entirely inadequate to meet the demands being made upon it. As has been mentioned, corn is a sun plant and grow to perfection only when the sunlight permeates to every part of its structure and corn grown largely in the shade as is sowed corn, though it may produce a large gross amount, yet the product is deficient in those volatile oils which so largely determine the quality of the food. The protein, the most valuable constituent, is deficient as will be seen by reference to the table giving the analysis of corn.

During 1895 and 1896 experiments were conducted to determine the relative feed value of corn planted in hills, drills and sown broadcast. The variety of corn used was Sibley's Pride of the North. The soil was gravelly loam and had been for years subjected to a four years' rotation, consisting of wheat, meadow (clover and timothy), corn and oats. During the winter of 1893-4 the land was given a top dressing of stable manure, about ten tons per acre. In the spring of 1894 the land was fitted, and planted to corn. After the corn was removed the land was plowed in the fall and gang plowed in the spring and the three one twentieth acre plats to be compared were planted May 2 and 3, 1895 to Sibley's Pride of the North. Plat 31 was planted in rows $3\frac{1}{4}$ feet apart with hills $3\frac{1}{2}$ feet apart in the row and 4 kernels to the

hill. Plat 32 was drilled in with a common grain drill, so arranged that the rows were $3\frac{1}{2}$ feet apart while the broadcast conditions were obtained by drilling in the corn with all hose of the drill open and sowing at the rate of two bushels per acre. The yield from the various plats is shown in the following table :

TABLE SHOWING RESULTS FROM DIFFERENT METHODS OF PLANTING CORN, 1895.

Plat No.	Manner of planting.	Yield per acre. Pounds.		
		Stalks.	Grain.	Total.
31	Hills.	15,340	6,000	21,340
32	Drills.	20,240	6,400	26,640
33	Broadcast.	29,580	00	29,580

In 1896 the corn was planted similar to the way in which it was planted in 1895.

TABLE SHOWING RESULTS FROM DIFFERENT METHODS OF PLANTING CORN, 1896.

Plat No.	Manner of planting.	Yield per acre. Pounds.		
		Stalks.	Grain.	Total.
22	Hills.	18,800	5,280	24,080
23	Drills.	19,390	2,304	21,094
24	Broadcast.	29,591	00	29,591

If the investigation had stopped here the results would clearly have been in favor of the broadcast method of seeding. This is as far as the producer is able to get unless he is of an especially enquiring mind and conducts careful feeding experiments with an endeavor to find out from the animal which material is best. At the time the corn was in best condition for forage, samples were taken from each plat. On the plats of hilled and drilled corn the

sample included the stalk and the grain, while of necessity the sample from the plat of sowed corn was only of the stalk, there being little or no grain formed. Care was taken to have the sample from each plat a good average of the produce of the plat. The analysis was made from the 1895 crop and assumed to fairly represent the crop of 1896 grown under similar conditions.

The following table shows the average yield from the plats for the two years and the estimated food value of each product, the computations being made from the analysis of the 1895 crop.

A careful study of the table will reveal several things, which without the aid of the chemist might have passed unnoticed. While the plat of broadcast corn gave the greatest total yield per acre yet little or no grain was formed and the feed value was relatively less than on the plat of corn planted in hills. Though the column giving the estimated value per acre does not necessarily represent the true feeding value yet it does correctly represent the relative value. If the analyses had been carried still farther and the proportion of digestible nutrients determined there is but little question that a wider difference would have been shown in the actual feed value. Could the animal have been questioned as to which method of planting furnished the best fodder she would have spoken in unmistakable terms in favor of that corn which was grown in the open sunlight.

The following quotation from Bulletin 16, Cornell Experiment Station, may be found helpful to an understanding of the tables.

"It seems still necessary that an explanation of the terms used should accompany all discussions of foods and fodders, and we may therefore be pardoned for repeating it here.

The value of a fodder in the main depends upon the amount and relative proportions of four classes of constituents. These are usually denominated by chemists as crude protein (nitrogen multiplied by 6.25), ether extract, nitrogen-free extract, and fibre.

Protein is the most costly and the most valuable constituent of fodders. Protein substances contain nitrogen and are often called albuminoids or flesh formers. They are found in all parts of all plants and all animals, and are important and indispensable con-

CORN AVERAGE.*
RESULTS FROM DIFFERENT METHODS OF SEEDING FOR 1895 AND 1896.

Manner of planting.	Yield per acre.			Analysis.								Esti- mated value per acre. †
	Stalks. Pounds.	Grain. Pounds.	Total. Pounds.	Moisture. Per cent.	Dry matter. Per cent.	Protein. Per cent.	Fat or ether ex- tract. Per cent.	Nitrogen- free ex- tract. Per cent.	Fibre. Per cent.	Ash. Per cent.		
Hills	17,070	5,648	22,718	68.67	31.33	2.83	.88	19.92	6.42	1.28	\$73.31	
Drilled	19,815	4,384	24,199	71.16	28.84	1.83	.68	18.13	6.94	1.26	\$66.83	
Broadcast	29,586	None	29,586	76.42	23.58	1.38	.60	14.04	6.37	1.19	\$68.17	

* The chemical work of this bulletin was done by Mr. Geo. W. Cavanaugh. The details of the field work in 1895 were conducted by Mr. Geo. C. Watson.

† Protein 2.3 cents per lb.; fat 1.14 cents per lb.; nitrogen-free extract and fibre 94 cents per lb.—*Conn. Exp. Station, 1893.*

stituents of lean meat, blood, and all internal organs. Since a large number of fodders are lacking in this class of constituents, the amount of protein that a fodder contains is largely a measure of its value.

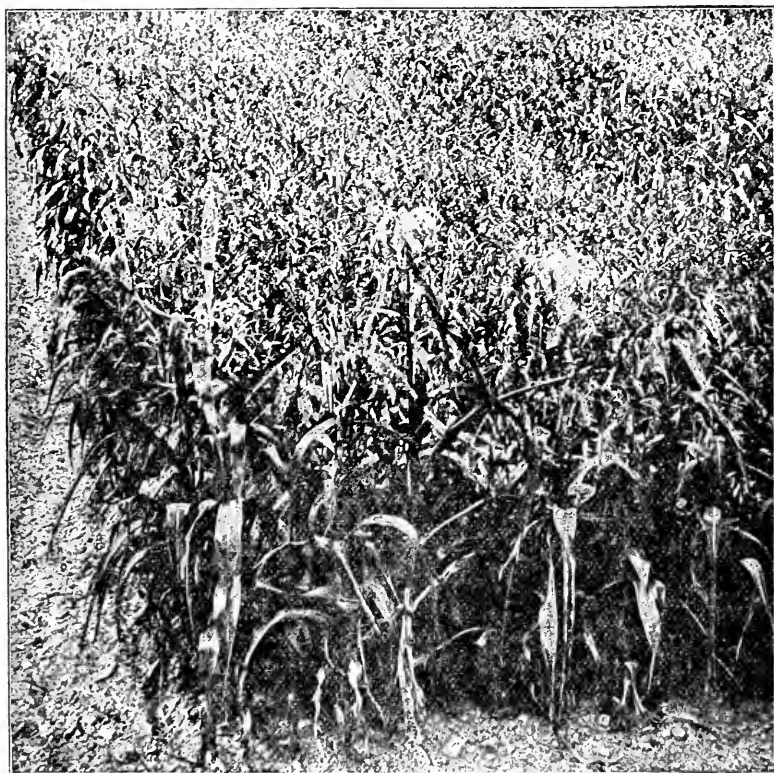
Ether extract is mainly composed of fats and oils, and is usually spoken of as such. It is used by the animal as a heat producer or stored up in the tissues of the body as surplus fat. For these purposes it is worth nearly two and one-quarter times as much as starch, sugar, gum, and other carbohydrates.

Nitrogen-free extract consists of those substances containing no nitrogen that are soluble in water and dilute acids and alkalies; it is mainly made up of starch, sugar, and gum, and the whole class is often spoken of as carbohydrates. The functions of these carbohydrates in the animal economy is mainly that of heat and fat producers.

Fibre is that portion of the plant not dissolved by the action of dilute acids and alkalies. In composition it is a carbohydrate, and its function as a fodder is the same as the other carbohydrates, but being less digestible is of less value."

A most important element which enters into determining the feeding value of corn is the degree of maturity it reaches before being cut. It increases in value very rapidly as it approaches the period of maturity. In the case of corn planted in hills so that it can be given tillage the moisture may be conserved even during drought so that the corn is enabled to continue growth until it reaches maturity and possesses its greatest feeding value. With the sowed corn conditions are entirely different, for long before the time of maturity the corn has ceased growth because the moisture supply has been used up. In 1896 the corn on the broadcast plat was dry and parched ready for cutting August 14th. Before cutting the plat two rows were cut from the outside where the sunlight and moisture had been more abundant. The weight of the forage from the two rows was 330 pounds. On the same date two rows were cut through the center of the plat where sunlight had been excluded and moisture deficient and the total weight of the forage from the two rows was only 81 pounds. The whole plat of broadcast corn was cut August 14th in order to save it. The adjoining plat of drilled corn was suffering from drought and

was cut August 21. The adjoining plat of hilled corn showed no signs of wilting and continued its growth and development until time of cutting September 8th.



74.—*A corner of a Plat of Sowed Corn.*

The very rapid increase in feeding value of corn as it approaches maturity should be understood all by producers whether the product is to be used for silage or fodder. The importance of the subject leads us to republish a portion of Bulletin 16 of this Station in which the matter is clearly set forth.

The best period for cutting.

“As the results of analyses made at different periods of growth

in 1888 we strongly urged* that only such varieties of corn should be grown for ensilage as would reach a good degree of maturity in the locality grown. These conclusions have been abundantly confirmed, not only by our own experiments repeated in 1889, but by similar experiments at several other stations.

The variety used was the same as last year, viz.: Pride of the North of a strain that has been grown on the farm for several years and has become well acclimated. The soil was a clayey loam. It was in clover and timothy sod and had received a good dressing of farm-yard manure during the winter. The corn was planted in hills three feet three inches by three feet eight inches apart, and received ordinary cultivation.

The season was late and very wet. The corn was planted about May 12, and the first cutting was made on August 2, at which time it was just coming into blossom and was at the same degree of maturity, as well as could be judged, that it was in 1888 on July 24th. On Aug. 17th the second cutting was made, the kernels were just beginning to fill with milk. The corn matured much more slowly in 1888 than in 1889, and further cuttings were made on Aug. 31st and Sept. 10th, during the period of "roasting ear" condition. The final cutting of the mature corn was made on Sept. 24th, no frost having intervened. The corn at this cutting was perhaps a trifle more mature than it was in 1888 on Sept. 3.

The samples were taken as follows: At each cutting three average hills were selected and cut close to the ground. They were then treated in the same manner as the samples of the different varieties already described. The table below shows the percentage composition at the various periods. It will be noticed that the most marked difference is in the great increase in dry substance between Sept. 10th and Sept. 24th. It will also be noticed that there was more water on Aug. 17th than on Aug. 2d. This is entirely out of the usual experience and may perhaps be due to the individuality of the plants sampled. In regard to the dry substance we find, as is usual, that the per cent of protein gradually diminishes and of carbohydrates and fibre increases as development approaches maturity.

* Bulletin No. 4. Cornell University Agricultural Experiment Station, p. 52.

TABLE IV.

DATE OF CUTTING.	STAGE OF MATURITY.	Water Per Cent.	Dry Matter Per Cent.	IN THE DRY MATTER.				
				Crude Protein Per Cent.	Ether Extract (fat) Per Cent.	Nitrogen-Free Extract (carbohydrates) Per Cent.	Crude Fibre Per Cent.	Ash Per Cent.
Aug. 2.....	In Bloom.	85.25	14.75	9.87	2.68	58.07	22.06	7.32
Aug. 17....	In Milk.	87.31	13.69	9.03	1.71	57.74	25.11	6.41
Aug. 31....	{ Roasting. Ear. }	82.56	17.44	8.84	1.96	55.21	28.43	5.56
Sept. 10....		81.37	18.63	6.17	2.43	59.06	27.19	5.15
Sept. 24 ..	Mature.	69.75	30.25	7.53	2.46	61.46	25.05	3.50

At each period of cutting, except the last, besides taking the sample, there were cut and weighed sixty hills of corn. The weight of the corn so cut was used as a basis for computing the yield of green fodder and of the various constituents per acre, except in the cutting of Sept. 24, when a measured acre was cut and weighed. These results are shown in the table below.

TABLE V.

DATE OF CUTTING.	STAGE OF MATURITY.	YIELD IN POUNDS PER ACRE.							
		Green Forage.	Per Cent. Water.	Dry Matter.	Crude Protein.	Ether Extract.	Nitrogen Free Extract.	Crude Fibre.	Ash.
Aug. 2.....	In Bloom.	24805	85.25	3658	361	98	2124	807	268
Aug. 17.....	In Milk.	27830	87.31	3810	344	65	2200	957	244
Aug. 31.....	{ Roasting. Ear. }	30250	82.56	5274	467	103	2912	1499	293
Sept. 10.....		28980	81.37	5398	333	133	3188	1466	278
Sept. 24.....	Mature.	30108	69.75	9109	686	224	5598	2282	319

It will be seen that between the first and last cutting the dry matter and carbohydrates increased about 150 per cent, the fat about 125 per cent and the protein nearly doubled. In our experiments last year* we found that the total feeding value, in the period between tasseling and ripening, increased 166 per cent, so that the experiments of this year confirm those of last.

Further than this, investigations at three other experiment stations have been made in almost exactly the same way and the results of all agree. These experiments in brief are as follows :

In 1887 Professor Whitcher, of the New Hampshire Agricultural Experiment Station, made analyses of four different varieties at four stages of growth.† The four varieties were a southern ensilage corn, a northern flint corn, Sanford (flint), and Pride of the North (dent). The cuttings were made July 26, Aug. 5, Aug. 19, and Sept. 16. At the first date none were in tassel but the northern flint ; at the last date the northern flint was completely ripe, the Sanford and Pride of the North were nearly mature, and the kernels of the southern ensilage were just blistering. Between Aug. 5th, at which time but one of the varieties had passed the blossoming stage, and Sept. 16th, there was an increase in dry matter of 112 per cent, in albumenoids of 50 per cent, in fat of 84 per cent, and in carbohydrates of 130 per cent.

In 1888, at the Pennsylvania Agricultural Experiment Station, Mr. Caldwell found‡ that between the period of tasseling and complete ripeness there was an average gain of dry matter of 155 per cent. Ten varieties of corn (dents and southern ensilage corn) were used. Only the dry matter was determined. The dates of cutting are not given, and the last determination was made from the ears and stover cut and shocked as for grain.

In 1889, at the New York Agricultural Experiment Station, a very thorough investigation of this subject was made by Mr. Ladd, chemist of the station.|| The variety used was King Philip ; the dates of cutting were July 30, Aug. 9, Aug. 21, Sept. 7, and Sept. 23, at which dates the condition of maturity was, re-

* Cornell University Agricultural Experiment Station Bull. 4. p. 52.

† New Hampshire Agricultural Experiment Station Bull. No. 3.

‡ Pennsylvania Agricultural Experiment Station Bull. 7, p. 7

|| New York Agricultural Experiment Station 8th Ann. Rept. p. 86.

spectively, tasseled, silk, in milk, glazed, and ripe. The computations were in each case based of the yield on a plot of a fifth of an acre so taken as to represent the average of a field of twelve acres. Between the first and last period there was an increase in dry matter of 389 per cent, of albumenoids of 183 per cent, of fat of 335 per cent, and of carbohydrates of 462 per cent.

In the above only the gain between the first and last periods is given, but the details show that the gain is continuous from period to period, and in general most rapid toward the last.

The results of all these experiments unite to show that there is a large increase of all the classes of nutrients as the corn proceeds from tasseling to ripeness.

It would seem as though the question of the proper time to cut corn for ensilage was definitely settled by these experiments. An increase of more than two hundred per cent between the periods of bloom and ripening cannot be ignored even though the proportion of the more valuable albumenoids is somewhat lessened. What gives the matter additional strength is that these experiments, including all the work so far done in this direction that has come to our notice, are unanimous in their conclusions."

The conclusions reached in the bulletin just quoted have in no way been disproven but have been amply confirmed by later experiments of this and other stations.

OATS AND PEAS AS FORAGE.

Ranking next to corn as a forage crop and a close second, comes oats and peas. In the two years in which we have been conducting experiments in the production of forage this combination has proven itself well worthy of a place on every farm where stock is kept. It is valuable either for pasture, for cutting as a soiling crop, or when allowed to mature it may be cured for hay, making a most valuable article. When planted in succession of about two weeks, the first planting being as early in the spring as conditions will permit, a succession of highly nutritious forage is produced which is greatly relished by stock. If a more general use was made of oats and peas for summer feeding it would

greatly decrease the expense of the production of milk and the cost of maintaining cattle and economize land very materially. A highly nutritious forage would be obtained, rich in protein and furnishing nearly a balanced ration for milch cows. A large amount can be produced per acre and it may be grown from early spring to late fall. A slight freeze does not affect it, and it may be sown in the spring before frosts are over and the late forage frequently remains in good condition until December. The oats and peas at this station sown August 1st, 1896, were in good condition for feeding until a severe freeze on the night of December 2d cut them down. For late forage, however, barley and peas are recommended instead of oats and peas. For sowing any time after July 1st substitute barley for oats. The reason for this is that in late summer barley makes more rapid growth, is less likely to attacks of rust and other fungous diseases than are oats. Figure 77 shows the relative growth of oats and barley in late summer, the tall plants being barley the shorter ones oats, seed for which was sown August 1st and photograph taken in late October.

Preparation of Soil for Oats and Peas.

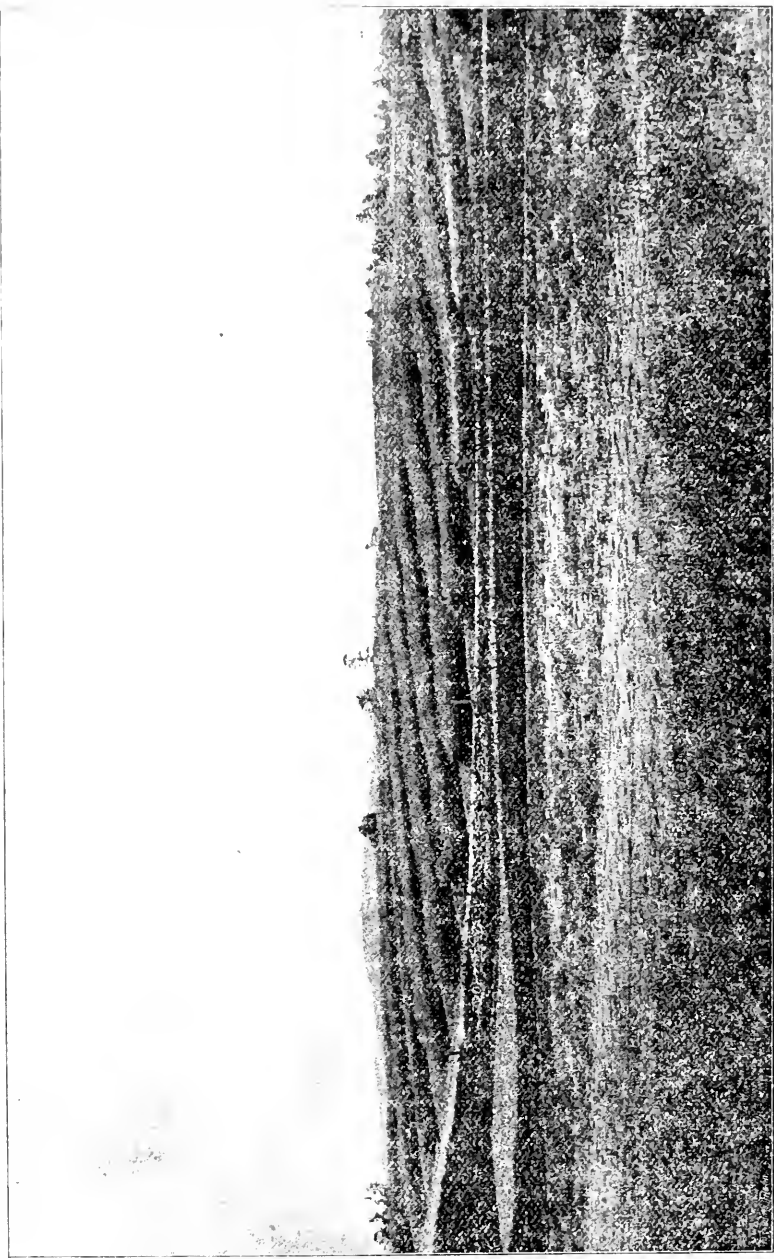
This crop loves a mellow, loamy soil but will grow fairly well on soils ranging between heavy clay and sand and produce liberal returns. For early forage land should be selected which is moderately open and porous so that the plowing may be done early. Those soils containing a comparatively large percentage of clay can better be used where late forage is desired. Land should be plowed deep and in cases where sod is inverted the jointer should be used.

Method of Seeding.

While the land is still rough as left by the plow the peas should be sown broadcast at the rate of about one bushel per acre. Then the harrow should be used and the land thoroughly fitted and fined for oats. This fitting will cover the peas deeply and well, and it is to secure this deep covering that the peas are sown directly after the plow. Oats may then be sown broadcast or drilled in the ordinary way, using one bushel to one and a half bushels of seed per acre. If the soil is somewhat porous, sandy or gravelly, the

roller may follow the seeding. But should there be a somewhat large per cent of clay in the soil then the rolling would better be deferred until the young plants are two or three inches high, when the roller can be used without danger of producing injurious soil conditions due to packing. In six to eight weeks from time of sowing, with favorable conditions, cutting may begin though the greatest feed value is not reached until the time the grain is well in the milk stage. The commencement of cutting, however, should not be delayed until that time for, if there is any considerable area to be fed, the forage will have become too hard and woody before all of it can be used to advantage. Commence cutting or pasturing at or before the time of blossoming and continue through the milk stage. If the area is greater than can be advantageously used for forage and it is desired to cure a portion of it for hay, then the cutting should be done when well in the milk stage. It makes such a heavy growth and contains such a large percentage of water that some difficulty is occasionally experienced in the curing.

In our efforts to determine the relative value of some of the more common forage crops an experiment has been conducted for two years, during 1895 and 1896. In 1894 a crop of corn was grown on the land which had received during the previous winter a small dressing of barn manure. The size of plats was one-twentieth of an acre. At the time the grain was in the best apparent condition for forage, one-half of each plat was cut and weighed and a sample taken and analyzed. The other half was allowed to mature the grain, when it was cut and threshed, and the weight of grain and straw determined. The feeding value of the forage was determined from the sample taken when the first one-half of the plat was cut and all results as to yield and value are calculated per acre.



• 75.—View of Plats, one-half of each plat has been cut for forage.

PRODUCTION OF FORAGE 1895. ALL PLATS SOWN APRIL 24.

Plat No.	Grain sown.	Date of cutting forage.	Weight of forage per acre.	Date of cutting ripe grain.	Amount of grain per acre. Bushels.	Weight of straw per acre.
42	Oats and peas	July 16	21,600	Aug. 3	85	5,280
43	Oats and barley	July 5	16,800	Aug. 3	82.5	3,760
44	Barley	June 29	11,600	July 23	55.6	4,080
45	Oats.	July 11	10,480	Aug. 3	50.6	3,580

PRODUCTION OF FORAGE 1896. ALL PLATS SOWN APRIL 20.

Plat No.	Grain sown.	Date of cutting forage.	Weight of forage per acre.	Date of cutting ripe grain.	Amount of grain per acre. Bushels.	Weight of straw per acre.
35	Oats, Am. Banner	June 30	14,080	July 22	56	4,200
36	Oats and barley	June 30	11,200	July 22	65	3,400
37	Oats and peas	July 1	26,000	July 22	49	2,360
38	Oats, White Russ'n	June 30	15,200	July 22	72.5	3,680
39	Oats, White Russ'n	June 30	17,080	July 22	78.75	3,480
40	Oats, Am. Banner	June 30	16,080	July 22	97.5	4,880
41	Oats, Silver Mine	June 30	19,320	July 22	90	3,920
42	Oats and peas	July 2	26,000	July 22	43.5	4,400
43	Oats and barley	June 27	18,000	July 22	60	5,400
44	Barley	June 22	15,200	July 22	50	3,600
45	Oats, White Russ'n	July 1	19,200	July 22	52.5	5,320

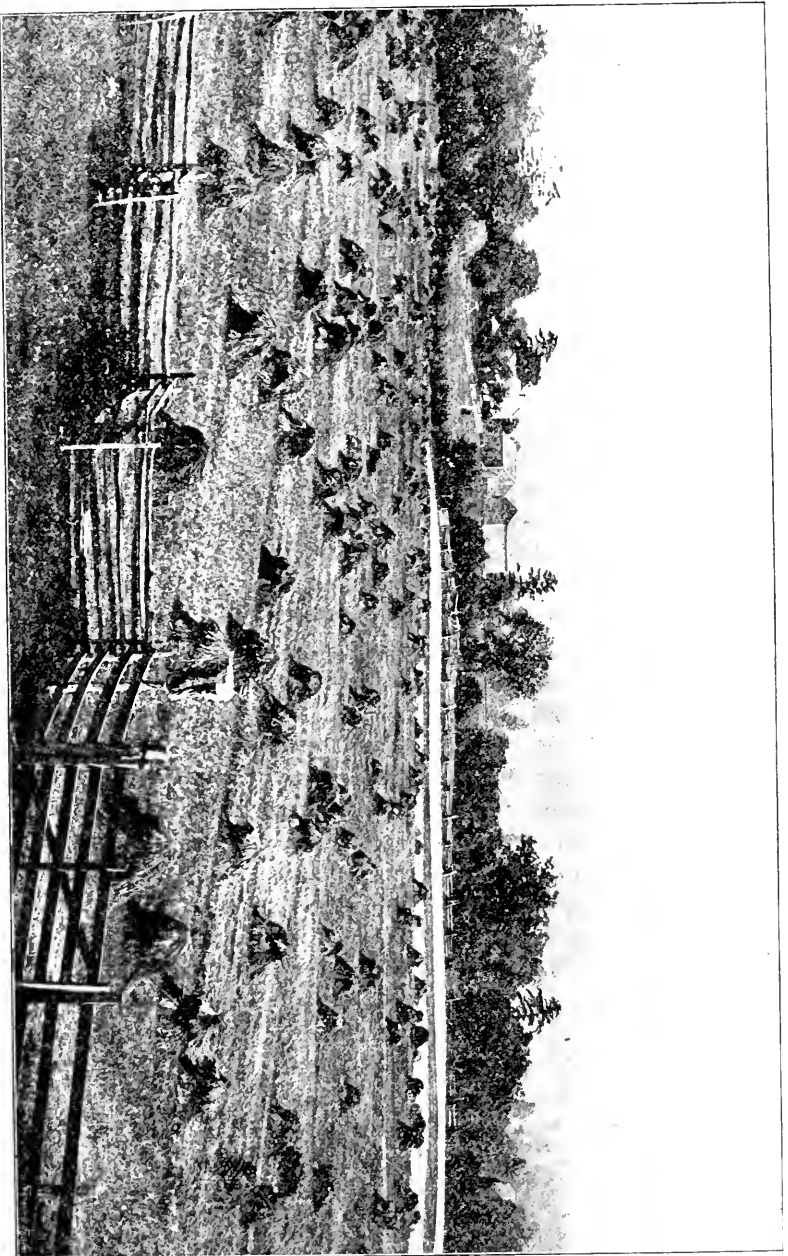
FORAGE CROPS.

Average Results 1895 and 1896. Calculated from the Analyses of forage made of 1895 Crop.

Crop planted.	Average yield per acre. Pounds.	Moisture. Per cent.	Dry matter. Per cent.	Analysis of dry matter.					Estimated value per acre calculated on dry matter.*
				Protein Per cent.	Fat. Per cent.	Nitrogen-free extract. Per cent.	Fibre. Per cent.	Ash. Per cent.	
Oats and peas.	24,336	75.99	24.01	16.58	4.21	41.67	27.75	9.79	\$63.11
Oats.	16,826	65.40	34.60	9.36	4.80	46.30	30.95	8.58	57.99
Barley and oats	15,333	65.59	34.41	10.14	4.36	49.28	28.92	7.30	43.39
Barley	13,400	77.01	22.99	11.33	2.07	50.32	29.92	6.36	31.99

* Protein 2.3 c. lb.; fat 1.14 c. lb.; nitrogen free; extract fibre .94.—*Conn. Exp. Sta. 1893.*

A careful study of the preceding tables will reveal several things. Though the estimated values given do not necessarily represent the actual feeding value, yet they do fairly show the relative value of the different crops for the production of forage. The unit of value used for the different constituents while not necessarily representing their value for all sections, does fairly represent their value for this state. The oats and peas are relatively rich in protein and ash elements. The protein is the most costly constituent which the New York feeder is called upon to provide, and it is this constituent which is most likely to be deficient in the ration. The ash constituent of a fodder is usually passed over without any comment, it being taken for granted that all fodders contain enough to meet the demands of the animal economy. But this conclusion is not based upon fact. The ash element of the fodder enters into the building up of the frame work of the body, the skeleton, and it is of the utmost importance that the mineral or ash material be present in liberal quantities. Oats and peas furnish a larger percentage of ash than any of the other forage crops grown by us and the importance of this, while not definitely known, is real and should not be overlooked.



76.—*Out Field at Cornell University. Back part of field being fitted for wheat.*

A comparison of the tables showing the feeding value of corn and forage crops shows that of all varieties tested, corn is in the lead and that oats and peas come second. For variety of feed it would probably be advisable to have some plats of barley or of oats and barley combined, but the greatest returns with us were secured from corn and from oats and peas sown broadcast.

BARLEY AND PEAS.

While oats and peas are recommended for early forage, yet for late forage barley should be substituted for the oats. Figure 72 shows the relative growth of barley and oats in late fall. On August 1 the plats on which the forage crops were grown were all seeded to oats and peas. The volunteer barley which came up on the plats where barley had been grown grew much faster than the oats and was less affected by rust and drought.

Figure 78 shows the corner of a plat of oats and peas which was sown August 15. This was the third crop which had been grown on the ground during the season. Wheat which had been sown the previous fall was cut for forage when the grain was in the milk stage. The ground was then immediately plowed and sown to Hungarian grass on June 29. On August 11 the Hungarian was cut, producing five and one-half tons of green forage per acre. The ground was immediately plowed and on August 15 sown to oats and peas which were photographed in late October. They remained in good condition for forage until December 2.

Rye as a forage crop has to recommend it the fact that it is available for early spring use. As a cover crop it is becoming more general and for this purpose it is valuable. The land on which corn or potatoes have been grown should not be allowed to go into winter without some cover crop. Rye serves this purpose well and where so used it can be made to serve the double purpose of a cover crop and an early spring forage crop. After removing the rye in the spring the land may be utilized for the production of forage from oats and peas or for other crops.

HUNGARIAN AND MILLETS.

There are probably no crops grown for forage or for hay about which there are more inquiries than the Hungarian grass and the



77.—Showing the relative growth of Barley and Oats for late forage.



78.—Plat of Oats and Peas grown for late forage.

millets. No doubt they would be more extensively grown were their value and uses well understood. They are not recommended as being valuable as a part of the regular rotation, but as catch crops or special crops they have their place. They are very depleting to the soil and many have had unsatisfactory experience in feeding them to stock. Every farmer should have a knowledge of the proper use of the millets and of their place in the farm economy.

Hungarian grass is in most common use in the east, while in the west common millet and in the south German millet are more popular. One value of millet lies in the fact that it can be sown late, in fact must not be sown until all danger from frost is over. It develops rapidly and during midsummer is ready to begin cutting for forage about thirty days from time of seeding. The Hungarian is quicker maturing than the millets and for late sowing is preferable to either the common or the German millet. In such a year as 1894 or 1895, when many farmers found their hay crop a disappointment and were at a loss to know how to supplement it, Hungarian or millet would possibly have served the purpose well.

The soil should be rich and given thorough preparation. Clay soils which are inclined to be lumpy require extra precaution in fitting. The amount of seed required varies from one-half bushel to three pecks per acre, which should be harrowed in lightly and rolled. On freshly cleared or bottom-land soils it makes a rank growth and is available for forage at a time when it is usually found necessary to supplement the pastures. Though it is a gross feeder yet this fact may be of actual benefit to the kinds of soil just mentioned.

Feeding millet green.

When stock is turned in upon a field of green millet for the first time, or a heavy feed is given, there is danger that serious results may follow. Animals not accustomed to green forage should not at first be allowed a full feed of any green crop, especially millet, but should be given only a part ration of the green material. If allowed to gorge themselves serious results may follow. If it is desired that the animals be turned upon the crop to pasture this should be done only after their appetite has been partly appeased by other food.

Millet hay is not in popular favor owing to the fatal results which, in some cases, have followed its use. Just why these unsatisfactory results sometimes follow does not seem to be clear. In feeding it to horses caution should be observed and the millet hay used in conjunction with some other coarse fodder. Much of the value of millet hay seems to depend upon the time of cutting, which should be done soon after blossoming.

SORGHUM, TEOSINTE, SACALINE, ETC.

These crops are mentioned in this bulletin only for the fact that many inquiries are received asking about their merits for this section. While sorghum seems to possess some value, yet for forage, corn is so far superior, when all things are considered, that where it can be raised sorghum is not a necessity in the rotation. It seems to possess its chief value in the fact that it is able to withstand drought and grow under conditions where corn would be a failure. So far as our experiments with teosinte and sacaline go we cannot recommend them for general use. Though they may possess value for certain localities, yet in New York there are so many crops which can be successfully grown for forage that the farmers should be slow to adopt the new varieties except by way of experiment until they have been tested and proven of value.

CRIMSON CLOVER.

Figure 79 shows a plat of crimson clover, the seed for which was sown August 1, the photograph being taken late in October. This clover was growing on land from which a forage crop of oats and peas had been cut. There has been much discussion at Farmers' Institutes and in the columns of the Agricultural press as to the value of crimson clover in this state, as a forage crop and as an improver of the soil. To answer these questions in part and to determine the relative value of the different clovers there were planted side by side on August 1, 1896, three plats of clover, one of crimson, one of common red and one of mammoth. The soil were gravelly and porous. All varieties of clover came up quickly and made good growth. The crimson clover, however, made far more rapid growth in the fall than did the others.

One object of these experiments was to determine the amount



79.—*Field of Crimson Clover.*

of nitrogen stored up by the different varieties of clover. On November 2, samples were taken of each kind of clover, the roots and tops of each being taken as the sample. The chemical analysis shows the following amount of nitrogen stored up in each per acre.

Variety of clover.	Nitrogen in tops (pounds).	Nitrogen in roots (pounds).	Total pounds of nitrogen per acre.
Crimson	125.28	30.66	155.94
Red	63.11	40.25	103.36
Mammoth	67.57	78.39	145.96

All clovers wintered well, but in the spring the freezing and thawing killed nearly all of the crimson clover. It had, however, served its purpose as a cover crop and for late fall pasture would have been valuable, leaving in the ground enough fertilizing material to pay for the expense of the seeding.

SUMMARY.

1. Some provision should be made on every stock farm for forage and soiling crops.
2. The most valuable crop for the production of late forage is corn, and corn planted in hills is more valuable for feeding purposes than when drilled or sown broadcast.
3. Oats and peas are second in value to corn for the production of forage. For late forage barley and peas are recommended.
4. Millets are valuable and when fed properly may be used without danger.
5. Crimson clover proved valuable for late fall pasture and as a cover crop. Its greatest value with us was from the fact of its storing up nitrogen so abundantly.

I. P. ROBERTS.
L. A. CLINTON.

Bulletin 136.

May, 1897.

Cornell University Agricultural Experiment Station,
ITHACA, N. Y.

HORTICULTURAL DIVISION.

CHRYSANTHEMUMS

OF 1896.



By L. H. BAILEY and WILHELM MILLER.

PUBLISHED BY THE UNIVERSITY,
ITHACA, N. Y.
1897.

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	Trustee of the University.
Hon. B. F. TRACEY,	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	Botany.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAM,	-	-	-	-	-	Treasurer.
EDWARD A. BUTLER	-	-	-	-	-	Clerk.

ASSISTANTS.

M. V. SLINGERLAND,	-	-	-	-	Entomology.
G. W. CAVANAUGH,	-	-	-	-	Chemistry.
L. A. CLINTON,	-	-	-	-	Agriculture.

In pursuance of the provisions of Chapter 128 of the Laws of 1897, the following persons have been appointed investigators and instructors in the College of Agriculture of Cornell University to serve throughout the state according to the needs of the several localities for a portion or all of the year.

J. W. SPENCER,	M. V. SLINGERLAND,	A. L. KNISLEY,
G. T. POWELL,	B. M. DUGGAR,	C. E. HUNN,
G. A. SMITH,	J. L. STONE,	H. B. CANNON, Chief Clerk.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in western New York.
125. A Disease of Currant Canes.
126. The Currant Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums.
132. Notes upon Celery.
133. The Army-Worm in New York.
134. Strawberries under Glass.
135. Forage Crops.
136. Chrysanthemums of 1896.

CORNELL UNIVERSITY, ITHACA, May 10, 1897.

HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY,

Sir.:—The following bulletin from the Horticultural Division is a part of the work which was planned under the Nixon Bill for last year. For two or three years considerable work has been done by this station in floriculture, with the object of helping both florists and flower-lovers everywhere. The bulletins have awakened much interest and have, undoubtedly, done much good in calling attention to a branch of agriculture which has heretofore received little consideration from the public institutions of the country. The work has been done with the greatest care and deliberation, and the bulletin is submitted for publication under Chapter 128 of the laws of 1897.

I. P. ROBERTS, Director.

I. GENERAL REMARKS. (*L. H. Bailey.*)

For three years we have made a special effort to study the problems associated with the florists' chrysanthemums, and this is the third report which we have published upon the work. Our object in this, as in all floricultural study, is to help both the general flower-lover and the professional florist, and we cannot, therefore, devote our attention wholly to amateur methods upon the one hand, nor to the raising of exhibition blooms upon the other.

We stand for the buyer as well as for the seller ; and the question therefore at once arises as to what the real measure of a variety is. Is one bloom, or one vase of blooms, chosen from a score or a hundred or a thousand plants which have received the utmost care and forcing, to be taken as the ideal of the variety? It is the fashion to describe varieties of florists' plants from just such blooms,—from those which draw the prizes in the exhibitions. But since there are few persons who can give this extra care and skill to the growing of a few plants, even if they cared to do so, and since only a part (and often a small part) of any number of plants can be expected to give such results, even under extra treatment, it is easy to see why the novelties are so often a disappointment to the buyer. The fact is, that the highly forced and extra-selected exhibition flower is not always the true measure of what a variety is, but is a measure of what may be done with a few plants. The true type or measure of any variety is the composite character which a whole patch gives, under good care. The flower show is of the greatest value as a popular educator and as a source of information and inspiration to the plant-breeder, but it is not the place in which the general flower-grower should expect to see what a variety actually is. It is often possible to select a few most meritorious exhibition blooms from a range of plants of an inferior variety.

If these points are well taken, then it follows that an experiment station, when reporting upon the merits of varieties, should

aim to present a true composite picture of what the variety is when grown under good and fair conditions. If the station exhibits, its province seems to lie in the same direction. At all events, the writer will never consent to make an exhibit of varieties from the station unless he can show everything, good and bad alike. This is not saying that he disparages the display of exhibition blooms by a station, but in such cases the exhibition is to show cultural methods, not to show varieties. If a station desires to test the varieties of any plant, it exceeds its aim when it endeavors to see how much it can improve those varieties by forceful culture; for the purpose is to find out what the varieties are, not what they may be compelled to be. And even if the experimenter were to desire to force every variety to the exhibition standard, he could not do so with several hundred varieties; and to force one and not another would be anything but truthfulness. These remarks seem to be necessary in order to place the subject of variety-testing in its true light, and to let florists see why it is that our descriptions of varieties are sometimes so unlike the descriptions in catalogues.

Another feature of the subject needs also to be touched upon. We said upon a former occasion that we do not always receive the best stock which dealers have. By this we mean that we believe that the ordinary run of commercial stock is commonly received, whilst the exhibition blooms at the flower shows are preferably grown from extra-good stock, which, in many cases, is not for sale. It is no doubt better that an experiment station should receive this commercial stock, for it thereby arrives at a more truthful conclusion as to the actual merits of the variety. In some cases we have received plants which are so poor that no fair and true idea of the variety can be obtained from them; and from such stock, and from that which may have received inadequate attention on our own part, we intend never to publish results. These remarks are made for the sole purpose of emphasizing the fact that the quality of the stock,—as respects vigor, healthfulness, early propagation, and the like,—is of the utmost importance in the growing of any plant, and particularly of florists' flowers. To bring the subject home, we have inserted a picture (Fig. 82, page 308) showing the variation with which

we often have to contend in the testing of plants. The two plants at the left are fit to produce excellent flowers (though not trained for the production of exhibition blooms) whilst those at the right are plants which are expected to be compared with them. The past season it was so necessary to give forceful culture,—by very heavy fertilizing,—to bring some of the plants into line, that the strong plants (which grew in the same bed) received an additional and perhaps untrue advantage. Even then, some of the plants could not be made to bloom.

It may be well to say, once for all, that these estimates of floral novelties are not mere hurried and incidental measurements and opinions. When any flower is under test, at least one man lives with it when it is in bloom. He spends the greater part of his time with it. Every description of the varieties is read and compared with the plants, the flowers are studied from every point of view, and an opinion is obtained from every visitor who has a critical knowledge of the subject. This careful study day by day is more than the florist, busy with the demands of trade, can expect to give. The errors, therefore, are those which are to be attributed to faulty judgment and to the behavior of plants grown from poor stock. In the following chrysanthemums, for example, the judgments are not those of Mr. Miller alone. They are a compound of the opinions of himself, Mr. Hunn, myself, and of many persons who visited us.

This means that we desire to do more, if we can, than to make a mere variety test. We should like to keep pace with the range of variation, the tendencies, and the needs, in any plant which we study. We have no desire simply to recommend varieties. We have no interest in a variety as such. If, for example, we commend Lenawee amongst chrysanthemums, it is not because we have the slightest concern for that variety as an entity or trade novelty, but simply because that name has been applied to what seems to be the highest development of a particular type of white flower. We hope that the evolution will reach a higher point in the present year.

A leading difficulty with old varieties of any flower is the fact that they tend to run out by variation. The very fact that such various results are got from different grades of stock is proof that

a variety may soon be broken up into a number of strains, some of which may be good and others bad. The careful grower, therefore, will either propagate his own stock of the varieties which he likes or else exercise the greatest care to see that the stock he buys comes from plants which are true to the type.

In respect to the varieties of chrysanthemums, I am convinced that there is too great a tendency to grow novelties. Some of the old varieties are still the best of their class and should be retained, and very many of the novelties—in fact, most of them—seem to represent no distinct advance. It appears to us as if these novelties are not always thoroughly tested and understood before introduction. If we could have a few extra-choice things introduced each year and all the rest left in oblivion, the interests of all parties would be more permanently enhanced.

We need, also, to give greater attention to the hardy or border varieties of chrysanthemums. We have given such exclusive attention to the glass-house flower that the very name chrysanthemum has come to mean, to people at large, the great, noble, florists' flower of November. But there are humbler forms of the plant which may be set in the open ground and there allowed to remain year by year, the same as they did in our mothers' gardens. Some of the modern forms of these plants are pretty and interesting. Even the old-time forms are not to be despised, for if they lack size and quality of bloom, they nevertheless give a wealth of color with very little trouble. The title-page illustrates an old-time, out-door type of chrysanthemum familiar to a former generation as garden artemisias. Their chief merit is hardiness; The flowers are produced in great profusion, and they extend the season of pompons a month or more after the first frost has killed the dahlias. It is the race from which the large Chinese chrysanthemums of the green-houses are said to be derived. We still see them in the old gardens, in various shades of red and yellow, and running into whites of the form of Comet asters. The flowers on the title-page are natural size.

II. CORNELL NOTES OF 1896. (*Wilhelm Miller.*)

Chrysanthemums at home—The principles underlying the cultivation of chrysanthemums are the same as those of other plants. Specific directions are given in bulletins 91 and 112. There are two other points which it is well to know. The choice of varieties is all-important to those who delight in getting the highest results from skill and patience. The form can be chosen

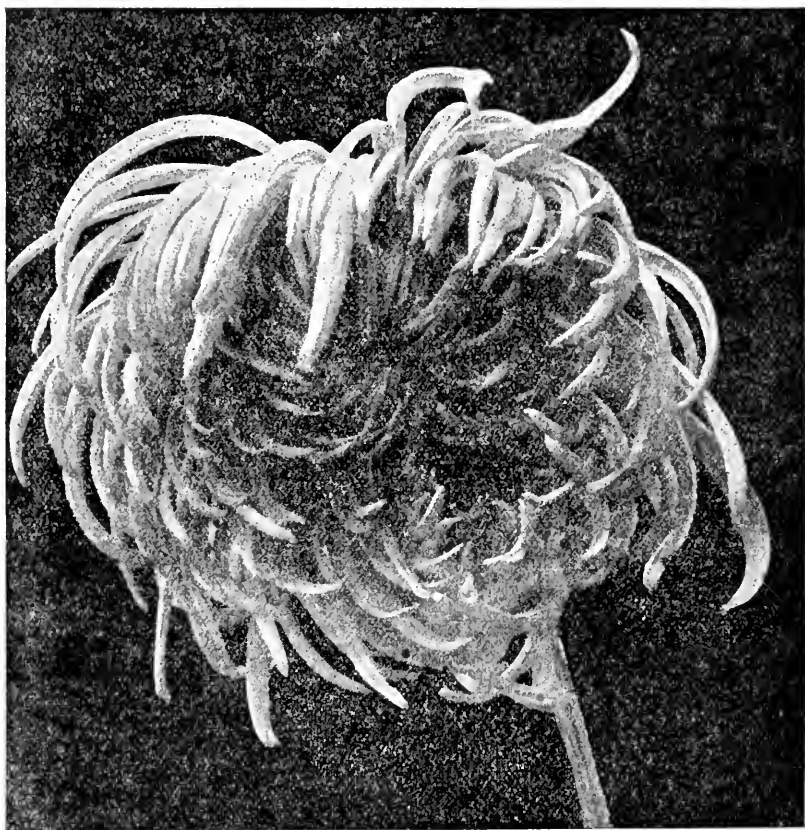


80.—*Oriental Glory*. Natural size.

from the illustrations in some of these bulletins and the description will tell the color. It is well to make a list with several substitutes. The best plan of all, if you attend chrysanthemum shows in the fall, is to note down the names of desirable varieties in case the names are given, as they should be. Another good point to understand is the theory and practice of draining a flower pot. The florist who is unwilling to show a buyer how he can straddle the stem of a plant with two fingers, tap the pot gently and lay bare the whole root system and drainage of his plant, is losing an opportunity to instruct his customer and to hold his future interest. If anything is wrong with a potted plant, look at the roots. Some people are afraid to handle plants. A potted plant has no objection to being turned upside down, and whoever has seen the broken bits of crock and the reason for the hole in the bottom of the pot (not made to be closed) will never again sprinkle the leaves of a plant or the surface of the soil only, when he desires to water it. Nature soaks her plants once in a while and capillarity does the rest. Chrysanthemums are for the common people as well as for the florist. Buy strong plants early (in May or early in June) and if you have no pots, plant them in small soap boxes. Make the soil rich, keep the plants free of insects and away from strong winds, train the plant into four or five strong branches (or more or less, as you desire), and pinch out all the buds, save eight or ten. If you want the largest blooms, grow to a single stem and allow only one flower to a plant. As cold weather approaches, the plants may be moved to the window, where they should bloom to perfection.

Amateurs are frequently disappointed in the growing of the novelties. The system of prizes and certificates is of more use to the professional or exhibition grower than to the amateur who is looking for a list of varieties. No amateur can make a mistake who gets good plants of *Laciniatum*, one of the good old forms. *Lillian B. Bird* is one of the most attractive of the tubular kinds and has always had, at Cornell, the softest and purest of light pinks we know among chrysanthemums, unless it be *Good Gracious* (See Fig. 81). This figure shows a "low center" and a "weak neck" two of the ancestral bogies of florists.

The very droop of this stem seems to me to add to the beauty. Indeed, chrysanthemums in vases are sometimes so stiff-necked that they cannot see anything but the ceiling. The list of good old varieties is large, and any wide-awake florist can give reliable information concerning them.



81.—*Good Gracious*, one of the older types.

Cultural notes of the 1896 test.—In 1895, our novelties were grown to a single stem and allowed to produce only one flower each. This is certainly the best commercial method of obtaining exhibition blooms and large cut flowers for sale in the cities.

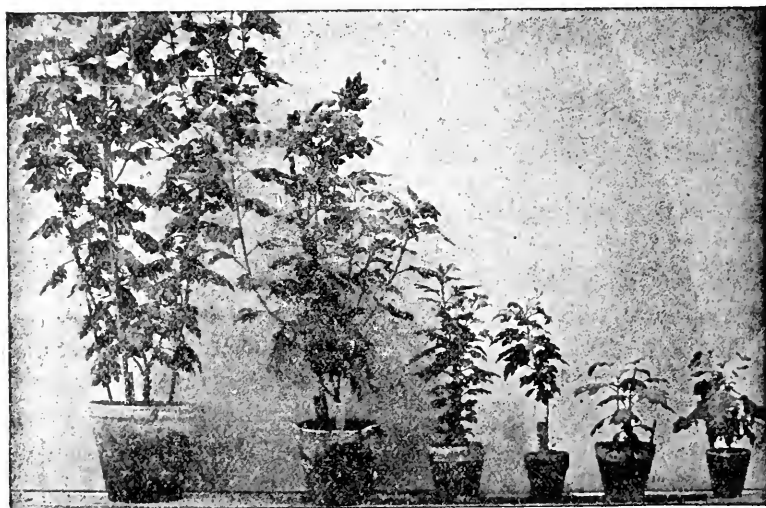
For all other purposes there is more satisfaction in having three to six flowers on a plant, as we did the past year.

We have never received so uneven a lot of plants as in 1896. It seems to be hopeless to get a uniform lot of plants representing all the novelties, in the year of their introduction. The last lot of American varieties came last year on the last day of August and the plants that were fit for testing together were not planted out in the bed until August 22, a month late for ideal results. This bed was composed of well rotted clay sod and manure, in the proportion of four to one. A liberal sprinkling of bone meal was worked in, and the bed thoroughly cultivated by hand. On the 26th of September, applications of liquid cow manure were begun. Never was there a more uneven lot of plants than those shown in our photographs of the bed, and never has Mr. Hunn, in his long experience with chrysanthemums, dared to give the bedded plants so much stimulating food. The results far exceeded our expectations, and the November display was a brilliant one, although the novelties themselves were not intrinsically as meritorious with us as in 1895, which was a year of exceptional advances.

The importance of beginning early can hardly be over-estimated. We got the best results from such plants as the largest one shown in Fig. 82. This was the typical home-grown plant from March cuttings. The next largest plant was a fair sample of a lot grown from rooted cuttings received April 22. The four small plants represent fair samples of lots received from different sources in summer. All of them were represented in the trial bed and none gave anything like the satisfaction we got from home-grown plants of varieties introduced the year before. There are two great factors in producing chrysanthemums,—the quality of stock received and the subsequent management. How important the former element is may be seen by contrasting Figs. 83 and 84. Here we have the best results that we were able to produce from poor and good stock. Notice how much fewer and weaker the rays are in the one case, and how completely double is the flower of Fig. 84. Indeed the latter has the over-fed look which one often sees in the exhibition hall. Coarse, heavy rays are not always a varietal characteristic but usually a mat-

ter of gross feeding, which really obliterates the more refined individuality.

A great year for whites—The year 1895 was marked by great advances among the yellows, and 1896 saw the introduction of many new types of whites. Out of more than one hundred varieties grown at Cornell, five of the six best were whites. These five, *Lenawee*, *Lady Esther Smith*, *Infatuation*, *Yanoma* and *Gretchen Buettner*, are all highly individual and attractive in form. For the third one on this list, *Mrs. W. P. Raynor* would



82.—Photograph Aug. 22. The two larger plants were potted early,—the four small ones received in July.

furnish almost an even choice. We dare not condemn it for being only a few days later, for that may not be a varietal character and no one can know, in a single season, whether it is a matter of culture or variety. Three others are strongly recommended by growers, *Autumn Bride*, *Mrs. H. H. Battles* and *Mrs. R. Crawford*, the first two for earliness, the last for lateness. These three were of familiar types and one of them we have had to condemn for other reasons. The other two we have noticed merely for their seasonable characters, of which no experiment station can judge as well as the large growers can. Three others

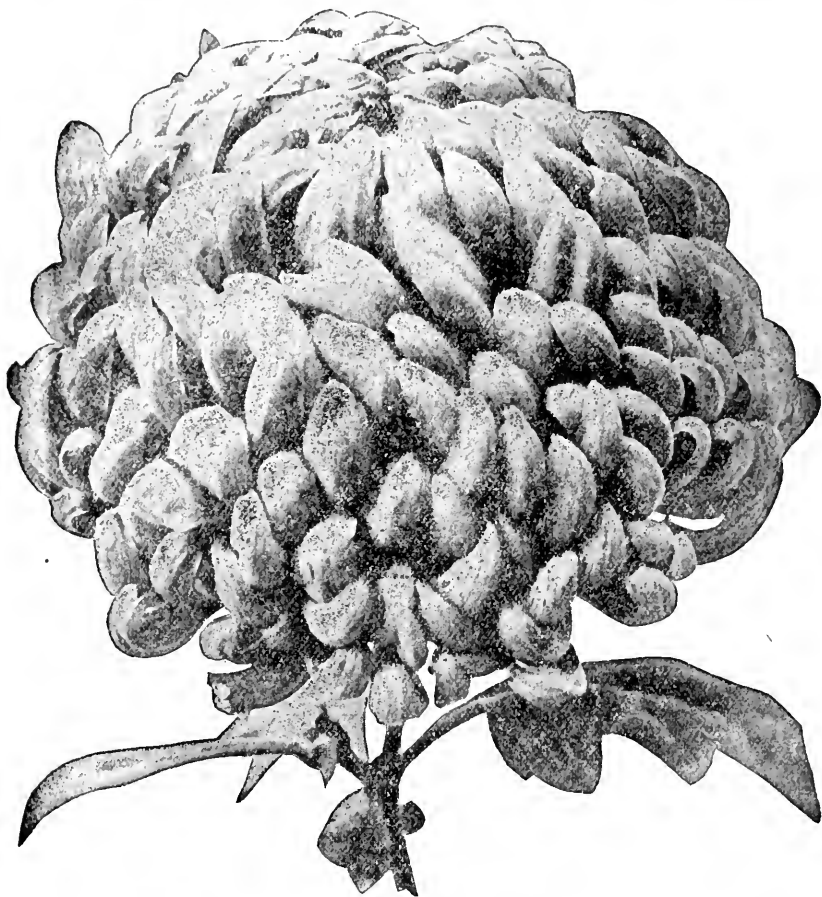
we have reluctantly placed on the list of promising sorts, *Miss Helen Wright*, *Dancing Maid* and *White Swan*. We shall try them again and secretly hope that they may be able to hold a place amidst increasingly severer competition. It is hard to pass over *New York* and *Gov. Matthews*, which were first-class in



83.—*Miss Magee*. The best that can be done with poor stock.

every respect but too much like *Mrs. R. W. E. Murray* (recommended in Bulletin 112) to be mentioned except as worthy substitutes. *Gov. Matthews*, it is true, is advertised as a pink, and so were *Mrs. Harry Toler*, *Sibyl Kaye*, and *Rosy Emperatrice*, but they all speedily turned white and were well worth the price as such, the two last, particularly, being an almost even choice

with *Infatuation* and *Lenawee* respectively. *Western King* had a faint primrose tinge but would pass for a white at a distance. *Robert F. Hibson* marks no advance in form, but its productiveness makes it a first-rate commercial white. So far as I know,



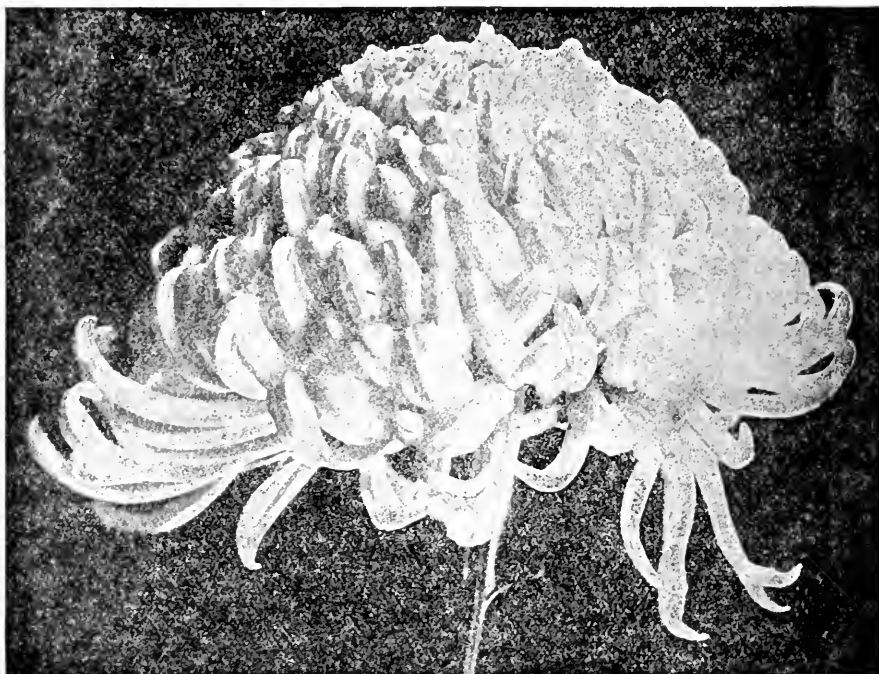
84.—*Miss Magee*. Showing what can be done with good stock. The name is nothing; the quality of the plant is everything.

the ideal hairy white variety is not yet known. *Mrs. Alpheus Hardy*, the first of the type and the one which started the chrysanthemum craze in America, is still extensively grown, but requires experience and skill to bring to perfection. The well-known *L'Enfant de Deux Mondes* is usually weak-necked.

In the yellows, the only advances in form were *Duchess of York* and *Buff Globe*, which latter looks like a buff sport of *Good Gracious* (Fig. 81). *Modesto* had nothing new in form or color but was unusually productive and has the look of a plain, every-day, successful, yellow chrysanthemum.

The pinks were a disappointment this year. Fourteen we have dropped outright. Two varieties (*Sibyl Kaye* and *Rosy Emperatrice*) were first-rate whites but were pink for only a few days. The only successful pink of the year amongst our lot, was *Mme. Felix Perrin* (or *Mrs. Perrin*, for they were as like as two peas), but we feel little confidence in the permanence of the color. We disagree as to the attractiveness of the oft-illustrated *Wm. Simpson*, as men always must differ in matters of liking, but we are agreed that our single plant had a weak stem and poor foliage. Two others, *Mrs. W. C. Egan* and *Miss L. Magee* we have indulgently placed on the promising list because we believe that we had weak stock. The real truth of the matter is that a pure and permanent pink seems not to have been attained. The various shades, from crimson to the faintest crimson-pink, are all treacherous. Even *Vivian Morel*, which is perhaps the best known of all the pinks, old and new, varies in intensity and quantity of color as much as the rest. We do not see how small growers can afford to buy new pinks unless they are sure of the quality of the stock. The number of varieties is very large, and the vigor of the individual plants, according to our experience, is of vastly greater importance; indeed it often seems to mean all the difference between success and failure. Kind and quantity of plant-food doubtless have something to do with bringing out color, just what we hope to find out this year by experiment on a wide range of shades. Perhaps, too, there are minor and undiscovered causes of this variability, and if there are any uncontrollable factors it is high time that the truth be known. What makes the problem peculiarly puzzling is that *Good Gracious* and a few other varieties have always had at Cornell a uniform amount of delicate light pink with no trace of crimson pink origin. Nevertheless we have never seen any chrysanthemum which matches the pure pink of Schuyler Mathews's color chart.

There seem to be at least four important factors that have to do with intensity of color,—quality of stock, time of rooting cuttings, food supply, and shading. How they are related and which are the most important, it is impossible to say at present. This much is clear, that mere vigor of plants is not all. We never had better plants in any way than *Rosy Emperatrice* and *Sibyl Kaye*, but the color simply showed itself, and was gone.



85.—*Rosy Emperatrice*. Reduced from a ten-inch flower.

Of the various combinations of red and yellow, two are recommended, *Pluto* and *Helen Owen*. Perhaps their forms are not entirely new, but *Pluto* was apparently ideal in all respects within its natural limitations of form and color, and *Helen Owen* was surely the second best of all the English varieties received as regards vigor and productiveness. Six other combinations of these colors were condemned for various reasons and five placed

on the promising list. It seems hard to put *Edwin A. Kimball* on a probation list, for it was perfect of its kind with us last year, but the competition is too keen, the popularity of its type limited, and there is always the possibility of a second year's cultivation reversing one's judgment. So far as we know, it is the best American variety of the type of which *Mrs. C. H. Wheeler* was a famous early representative,—the high-built, almost conical form with heavy, incurved rays, offering frequent suggestions of dark red, while the old-gold of the reverse is the chief feature in the general effect. ("The Golden Flower, *Chrysanthemum*," Mr. Mathews's beautiful art-work has a colored picture of *Mrs. C. H. Wheeler*. That variety appears to be not double enough to suit the florists.) Four English varieties of the same sort have been gathering strength for a fair race with *Edwin A. Kimball* this year, and only one can win.

Two green-flowered plants had little to commend them. They were too exhausted to do much more than declare themselves no monstrosities like the green rose and the green dahlia, but their flowers were weak and yellowish. We shall await their return with curiosity.

Nearly all of the varieties of 1895 recommended in Bulletin 112 were grown again this year, and in general they were not disappointing. *Mrs. Henry Robinson*, the best white of 1895, was not as early in 1896, as expected. *Crimsona* was badly spotted on the face of the rays with the color of the reverse. A rush of work at a critical time caused this collection to be neglected during the disbudding season and we got plants bearing great numbers of small blooms. The mass-effect was very strong, but nearly all of the pronounced types of the year before suffered a loss of individuality. The labor of disbudding chrysanthemums is great and one must always get ahead of the plants.

The variety test of 1896 has been conducted as formerly,

NOTE.—One of the novelties of the year was the Edible chrysanthemum. The plant was the earliest 'mum in the entire collection, but it was of poor habit and bore very few leaves and had a medium-sized yellowish flower of small merit from the florists' standpoint. This variety is said to be cultivated extensively in Japan for the flower heads, which are boiled and eaten; but we fail to see why this particular variety is more edible than other 'mums.

L. H. B.

photographs, dried specimens, and notes on botanical and horticultural characters being taken. In color determinations, the chart of F. Schuyler Mathews proved as satisfactory as with the dahlias. It answered our purpose well, but the florists and



86.—*Lenawee*. From a white flower eleven inches in diameter.

cataloguers can hardly be expected to use the terminology of the artist. In trying to help the raiser of novelties and the purchasing florist, we shall this time try an experiment. Instead of writing technical descriptions which are apt to be dreary and

mystifying to the general reader and of interest only to the trade, we have given accounts of behavior and judgments of merit. The men who created these things have described them in their own catalogues. Moreover, no description can have the influence of a picture, and in this picture-making age there are few novelties that are not illustrated in the catalogues or trade journals.

While all admit that it is unsafe to recommend or condemn any novelty on one year's acquaintance, some judgment must be made. By placing the word "good" at the head of the following list we do not mean to guarantee the essential and permanent merit of any variety. These varieties are the ones that behaved best with us, and of the hundred or more sorts tested, these twenty are, in our judgment, the ones most likely to achieve anything resembling permanent success. But the problems of variety-study must forever contain uncontrollable factors. The analysis can never be complete, and therefore the prophecy can never be as certain as in some other departments of science.

GOOD VARIETIES.

Twenty-four varieties are named somewhat in the order of merit under their respective colors. The names in parentheses indicate the source of stock plants and usually the introducer.

Whites.

Lenawee (Smith).—By far the largest and most attractive flower in our collection of 1896. The form is strikingly individual. Early, prolific and one of the longest keepers. The only possible objection to it is that it may be too flat and sprawling for use in bunches of cut flowers. Fig. 86.

Smith, Lady Esther (Owen).—Easily the largest and best of the varieties received from England for trial. Rays four inches long and often an inch or more wide, very flat, and of good substance. Apparently quite ideal.

Infatuation (May).—Smaller than the last but of good size. Early, and lasts three weeks on the plant. Form distinct and attractive. *Mrs. W. P. Raynor* was a few days later with us, but otherwise almost an even choice with *Infatuation*.

Yanoma (Smith).—By far the best late white we have ever grown. Exceptionally prolific, and has all the traits of thoroughbred commercial sorts.

Buettner, Gretchen (Hill).—A high-built flower of strong enough character to be worthy of a permanent place in the much overcrowded midseason section.

Hibson, Robert F. (P. & M).—Advertised as an early, reflexed Japanese. was midseason with us, prolific, and a good commercial variety.

Raynor, Mrs. W. P. (Spaulding).—A few days later than *Infatuation* but otherwise an almost even choice.

Autumn Bride (Smith).—Mentioned only because of its being the earliest white with us this season. Flowers do not last long.

Crawford, Mrs. R. (Spaulding).—Noticed because it is a late white. Of its lateness and commercial qualities no experiment station can judge as well as growers. *Yanoma* was more prolific and the form more attractive.

Pinks.

Perrin, Mme. Felix (Smith).—Best crimson pink in the bed. The form is regular, incurved, and somewhat stiff. Color faded slightly. Recommended only as being the best pink of the year and not for any permanent advance.

Perrin, Mrs. (Hill).—Color and form were not distinguishable from the above. A few days later was the only difference with us.

Simpson, Wm. (Blanc). The form of this crimson pink variety is more unusual and less conventional than of the preceding. Our single plant had a large, early, long-keeping flower which faded little, but the foliage was so scattered and the neck so weak as to make it impossible for us to recommend it from our experience for extensive commercial use.

Rosy Emperatrice (Yoshiike).—Pink for only a few days, rapidly fading to white. Almost as large and long-keeping as *Lenawee* and of similar form. Fig. 85.

Kaye, Sibyl (Spaulding).—Faded from pink to white as rapidly as the last, and kept for a long period. The form is somewhat similar to that of *Infatuation*.

Yellows.

York, Duchess of (Hill).—Form reflexed, loose, graceful and flowing. Color a soft and rather light yellow, beside which the next is bold and metallic. It is on three of our four lists of recommended varieties, for it is one of the best yellows we have ever seen.

Modesto (Smith).—Form common but popular. Color bold and strong. It has all the marks of a successful commercial variety.

Other Colors.

Pluto (May).—Red, reverse yellow. The best of its color and type yet seen at Cornell. While essentially a commercial sort, it is just the thing for amateurs because of its interesting stages of development.

Buff Globe (Yoshiike).—Noted as having the peculiar form and drooping habit of *Good Gracious* which is very attractive to many people. The color is pretty and restful but cannot compete for attention in a large crowd with the more vivid ones.

Owen, Helen (Owen).—A deep, quickly incurving Japanese flower, with a low center like that of *Good Gracious*, the youngest rays tightly whorled and showing the sulfur reverse. Face of rays chiefly brownish flesh and yellow. There is plenty of room for this and *Pluto*.

Violescent (Smith).—A large, deep, compact flower, the pinkish tinge being delicate and rather short-lived with us. An ideal commercial and exhibition sort, if one could be sure of the color. Even as a white variety, however, it would be a distinct success.

Oriental Glory (Yoshiike).—High built, compact, cylindrical, whorled, white, the whorled inner rays suffused with delicate crimson pink which fades as flower becomes older. The cylindrical form relaxes about the same time to the spherical. We had only one plant and one flower and cannot judge of its commercial qualities. Fig. 80.

Western Pride (Yoshiike).—Cardinal, reverse greenish yellow. Recommend to amateurs who like fantastic and Japanesque creations. The younger stages are the most eccentric and interesting.

Hairy.

Midnight (Spaulding).—Noted because it is an odd color in this class. The shade of crimson is rather dull and not as attractive as the familiar *Louis Boehmer*. Mrs. H. N. Higinbotham has been grown here to a much greater size.

Freeman, Mrs. C. B. (Spaulding).—This is the only yellow variety we have seen of this class. The color fades as much as the very popular *Philadelphia*.

From the preceding twenty-four varieties we have made selections for special purposes :

General collection of ten for commercial purposes : *Lenawee*, *Lady Esther Smith*, *Infatuation*, *Mme. Perrin*, *Pluto*, *Modesto*, *Duchess of York*, *Yanoma*, *Violescent*, *Gretchen Buettner*.

Six varieties for exhibition : *Lenawee*, *Lady Esther Smith*, *Mme. Perrin*, *Pluto*, *Modesto*. To complete the set Mr. Hunn and Mr. Hasselbring (a practical florist) would choose *Violescent* ; Mr. Miller would choose *Oriental Glory*.

Six varieties for pot plants : *Lenawee*, *Mme. Perrin*, *Pluto*, *Modesto*, *Duchess of York*, *Yanoma*.

Amateur's list of six : *Oriental Glory*, *Duchess of York*, Mrs. C. B. Freeman, *Buff Globe*, *Gretchen Buettner*. To complete the set Mr. Hunn and Mr. Hasselbring would choose *Helen Owen* ; Mr. Miller would choose *Western Pride*.

PROMISING VARIETIES.

The following list contains varieties of all degrees of merit, and especially those which by reason of lateness of arrival (e. g. the English), or poor quality of stock, did not have fair play this season. The figures at the left are the numbers of the varieties on our own books.

8. *Alps*.
1. *Ashmead*, F.
4. *Avellan*, *Amiral*.
10. *Bonnie Dundee*.
12. *Buettner*, *Emil*.
28. *Dancing Maid*.
29. *Devis*, W. S.
30. *Egan*, Mrs. W. C.
33. *Emerald Gem*.
36. *Godfrey*, Mrs. J. W.

- 38. *Green Emerald.*
- 45. *Invincible.*
- 48. *Ito, Admiral.*
- 54. *Kahma.*
- 50. *Kimball, Edwin A.*
- 61. *Magee, Miss L.*
- 60. *McHattie, J. W.*
- 72. *Owen, Walter.*
- 82. *Ridgeway, Lady.*
- 81. *Roberts, Gen.*
- 94. *Taiwan.*
- 87. *Triomphe de St. Laurent.*
- 99. *Western King.*
- 98. *Wright, Miss Helen.*

UNPOPULAR VARIETIES (*the Chinese type.*)

The varieties 20 and 88 here named were the best of the novelties in this now unpopular class. These varieties are good of their type, but the Chinese or ball-form class is in such little favor that it seems almost necessary to put these varieties in the unpromising list. All the rest of our Chinese sorts of the year were much below the average of what we have formerly seen.

- 13. *Bock, Betty.*
- 21. *Cotumbine.*
- 20. *Curtis, Chas. H.*
- 44. *Haigh, George.*
- 42. *Hatfield, Mrs. T. D.*
- 51. *Kingston, Mrs. R. C.*
- 62. *Mongolian Prince.*
- 88. *Signal Light.*

LESS PROMISING VARIETIES.

The following list of less promising varieties contains those novelties in which we seem to detect essentials that are likely to disqualify them permanently; the judgments are formed solely upon the behavior of the plants at Cornell in 1896. How to treat the great number of sorts that are no improvement on old and established kinds but apparently just as good, is a perennial puzzle. (I am not speaking of those that are identical, but of those that are so similar as to be horticulturally synonymous.) Our rule is to offer them as equivalents or substitutes whenever their merits are urgent, and discard the rest. Fine flowers do not make fine varieties. We know how the old plants respond to cultural conditions, but what of the new?

Varieties and fashions are proverbially ephemeral and our judgments can hardly be as ruthless as those of Time himself—the Prince of novelty testers. Probably not ten of these hundred new things will be alive in another decade.

The amateur, who loves everything that grows, feels no failures. To the florist, disappointment means dollars. What does the lover of plants care for shipping qualities or the lastingness of cut flowers? The enthusiast's standards do not know the oxidizing touch of trade.

To the introducer and to the florist, we merely report that the varieties named below seemed failures to us for reasons that we will gladly communicate privately, just as we are glad to furnish an account of the behavior of any collection of numbered seedlings, which may be sent us. No variety has been dropped for any one reason, and particularly not for misbehavior during one season, for such failure is sometimes a matter of variety and sometimes a matter of individual plants. We give in brief compass some hints as to the most obvious defects in the varieties named below. To avoid multiplication of words, numbers are used instead of names:

Lacking size 16, 19, 91; poor habit 32, 39, 58, 68; lacking productiveness 18; too much center 6, 39; raggedness 7; coarse and heavy 11; seasonal (not early or late as advertised) 16, 91, 35, 65; crimson pink (color unstable, or badly laid on) 3, 5, 6, 7, 11, 19, 24, 35, 37, 57, 65, 75, 85; foreign to American taste 49, and yellows more popular in England than here 22, 67, 70, 83; no improvement over old sorts known to us 22, 39, 41, 43, 52, 59, 65, 68, 70, 73, 77, 78, 83, 91, 100.

7. *Alonzo.*
3. *Amaranth.*
5. *d'Angleterre, Reine.*
6. *Antoinette.*
16. *Battles, Mrs. H. H.*
11. *Biddencope, J.*
18. *Budd, Gov.*
22. *Clarence.*
19. *Consuelo.*
24. *Dalskov, Miss Agnes E.*
32. *Edible.*
35. *Glory of the Pacific.*
39. *Golden Harvest.*
37. *Great Port.*
43. *Headlight.*
41. *Hurrell, Henry.*
49. *Jones, M. H. J.*
52. *Keim, J. R.*
55. *Lear, Miss M.*
59. *Liberty.*
58. *Loomis, Adelaide.*
57. *Louise.*
67. *Mars.*

- 65. *Matthews, Gov.*
- 68. *Miller, Paul L.*
- 69. *Nanshon.*
- 70. *New York.*
- 73. *Oyama, Marshall.*
- 78. *Peabody, Mrs. J.*
- 75. *Pratt, Cecil.*
- 85. *Rena Dula.*
- 83. *Rinaldo.*
- 90. *Snow Field.*
- 77. *Souvenir de Petite Amie.*
- 91. *Terrell, Constance.*
- 93. *Tippecanoe.*
- 97. *Violet King.*
- 100. *Whitcombe, Jessie.*
- 101. *White Swan.*

NOT TRUE TO NAME.

- 9. *Bellem.*—Not true to description. Advertised pink. Was primrose-yellow
- 14. *Buettner, Mrs. Emil.*—Not true.
- 31. *Ellis, Ruth.*—Not true. Advertised as blush white. Was a faint yellow fading much more than *Philadelphia*.
- 92. *Toler, Mrs. Harry.*—Advertised as flesh pink, slightly hairy, full and double. With us, this was a good commercial midseason white but *Robert F. Hibson* was more completely double.
- 103. *Yellow Plume.*—Was pink with us.

SUMMARY.

A few plants can be grown in the home window and made to produce flowers equal to any pictured in this bulletin. Page 305.

Take note of varieties at your local flower shows and insist on the educational side of the exhibit.

Amateurs will take most comfort in growing plants having three to six large characteristic flowers. Page 307.

The quality of stock plants is of the highest practical importance. Page 307.

The great advances in form among the introductions of 1896 were made in the whites. Page 308.

Modesto, the most productive yellow of the year, is typical of commercial standards. Page 311.

No true pure pink appears to have been obtained in chrysanthemums.

The intensity of color among the so-called pinks depends upon little-understood cultural conditions. Page 313.

Lists of varieties recommended on the basis of one year's behavior on Page 317.

List of varieties that failed to give satisfaction at Ithaca in 1896 on Page 320.

L. H. BAILEY.
WILHELM MILLER.

Bulletin 137.

May, 1897.

Cornell University Agricultural Experiment Station,
ITHACA, N. Y.

Agricultural Extension Work:

SKETCH

of its

Origin and Progress.

PUBLISHED BY THE UNIVERSITY

ITHACA, N. Y.

1897

ORGANIZATION.

BOARD OF CONTROL: THE TRUSTEES OF THE UNIVERSITY.

STATION COUNCIL.

President, JACOB GOULD SCHURMAN.

Hon. A. D. WHITE,	-	-	-	-	Trustee of the University.
Hon. B. F. TRACY,	-	-	-	-	President State Agricultural Society.
Professor I. P. ROBERTS,	-	-	-	-	Agriculture.
Professor G. C. CALDWELL,	-	-	-	-	Chemistry.
Professor JAMES LAW,	-	-	-	-	Veterinary Science.
Professor J. H. COMSTOCK,	-	-	-	-	Entomology.
Professor L. H. BAILEY,	-	-	-	-	Horticulture.
Professor H. H. WING,	-	-	-	-	Dairy Husbandry.
Professor G. F. ATKINSON,	-	-	-	-	Botany.
M. V. SLINGERLAND,	-	-	-	-	Assistant in Entomology.
G. W. CAVANAUGH,	-	-	-	-	Assistant in Chemistry.
L. A. CLINTON,	-	-	-	-	Assistant in Agriculture.

OFFICERS OF THE STATION.

I. P. ROBERTS,	-	-	-	-	-	Director.
E. L. WILLIAMS,	-	-	-	-	-	Treasurer.
EDWARD A. BUTLER,	-	-	-	-	-	Clerk.

In pursuance of the provisions of Chapter 128 of the Laws of 1897, the following persons have been appointed investigators and instructors in the College of Agriculture of Cornell University to serve throughout the state according to the needs of the several localities for a portion or all of the year.

J. W. SPENCER,	M. V. SLINGERLAND,	A. L. KNISLEY,
G. T. POWELL,	B. M. DUGGAR,	C. E. HUNN,
G. A. SMITH,	J. L. STONE,	H. B. CANNON, Chief Clerk.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1897.

124. The Pistol-Case-Bearer in western New York.
125. A Disease of Currant Canes.
126. The Currant-Stem Girdler and The Raspberry-Cane Maggot.
127. A Second Account of Sweet Peas.
128. A Talk about Dahlias.
129. How to Conduct Field Experiments with Fertilizers.
130. Potato Culture.
131. Notes upon Plums.
132. Notes Upon Celery.
133. The Army-worm in New York.
134. Strawberries under Glass.
135. Forage Crops.
136. Chrysanthemums.
137. Agricultural Extension Work, sketch of its Origin and Progress.

AGRICULTURAL EXTENSION WORK: SKETCH OF ITS ORIGIN AND PROGRESS.

The law under which the extension teaching of agriculture is now being prosecuted in New York State by the College of Agriculture of Cornell University, at first was an Experiment Station measure. The bill originated entirely with the people, when, in 1893, certain Chautauqua County persons asked the Station to undertake experiment work in their vineyards. We replied that while we should like to take up the investigations, our funds were insufficient to meet the expense without endangering work in which we were already engaged ; and this lack of funds would be keenly felt if other sections of the state should also, following the Chautauqua example, ask for help. We suggested to them, therefore, that if their local horticultural society could raise sufficient funds to meet the expense of fertilizers, traveling and incidentals, we would try to detail a man to look after the work. The matter dropped there ; but the next winter we heard of a movement among the Chautauqua people to obtain a small state appropriation to pay for experiment work in their vineyards. The project was placed in the hands of S. F. Nixon, Assemblyman from Chautauqua County, who, early in 1894, obtained a grant of \$16,000, one-half of which was to be expended by the Cornell Experiment Station in work in horticulture in the Fifth Judicial Department of the State, an area comprising sixteen counties of western New York. This is the only instance, so far as we know, of a movement for experiment station work which has been initiated and pushed to a final passage wholly by a farming community. The laws upon which our land-grant colleges and the agricultural experiment stations are founded were conceived and completed almost wholly by a comparatively small body of educators and experimenters, aided by persons in the various professions.

The clause in the law of 1894 which appropriated money to

the Cornell University Experiment Station, is as follows : "The sum of eight thousand dollars, or so much thereof as may be necessary, is hereby appropriated, to be paid to the agricultural experiment station at Cornell University, for the purpose of horticultural experiments, investigations, instruction and information in the fifth judicial department, pursuant to section eighty-seven of the agricultural law." The law also provides that "such experiment station may, with the consent and approval of the commissioner of agriculture, appoint horticultural experts to assist such experiment station, in the fifth judicial department, in conducting investigations and experiments in horticulture; in discovering and remedying the disease of plants, vines and fruit-trees; in ascertaining the best means of fertilizing vineyards, fruit and garden plantations, and of making orchards, vineyards and gardens prolific; in disseminating horticultural knowledge by means of lectures or otherwise, and in preparing and printing, for free distribution, the results of such investigations and experiments, and such other information as may be deemed desirable and profitable in promoting the horticultural interests of the state. * *

* * All of such work by such experiment station and by such experts shall be under the general supervision and direction of the commissioner of agriculture." This bill became a law, by the Governor's signature, May 12, 1894. In the legislature of 1895, Mr. Nixon introduced a bill to continue the work, but increasing the amount given to Cornell University Experiment Station to \$16,000. This second bill became a law on the 4th of April, 1895.

Upon taking up the work provided for by the bill, in the early summer of 1894, the Cornell University Experiment Station placed the enterprise in the hands of a chief "horticultural expert," in the language of the law, and Professor L. H. Bailey was chosen to that office, with the expectation that most or all of the work should be completed during the summer interrim. In entering upon his duties, this officer laid out three general lines of work, as specified in the law,—“conducting investigations and experiments,” “disseminating horticultural knowledge by means of lectures or otherwise,” and “preparing and printing” the results of the work. In other words, the work was to be divided between research, teaching, and publication.

The enterprise was new and untried ; the territory to be covered was large, the interests varied, and the demands numerous ; and the promoters of the bill had large expectations of the results. The responsibility of inaugurating the enterprise was keenly felt, or a mistake in the beginning might be expected to exert a serious and baneful influence upon future legislation designed to improve the conditions of rural life. The officer in charge was extremely fortunate, however, in having the hearty support of his colleagues, the free coöperation of the commissioner of agriculture, and, above all, the kindly and intelligent interest of scores of horticulturists in his territory. It was conceived that, in the beginning, a comparatively small and well digested enterprise prosecuted by a few carefully chosen men would be productive of better results than any bold attempt, with a large force, to carry the work into every part of the fifth judicial department. Inasmuch as the original grant was obtained through the exertions of the grape-growers of Chautauqua County, it was designed to undertake careful studies of the vineyard interests at the outset. The immediate charge of this work was placed in the hands of the late E. G. Lodeman, assistant in horticulture, who, to fit himself more specifically for certain problems which were presenting themselves, went to Europe (at his own expense) and visited the vineyards of the Rhine, of Italy and Southern France. The entomological inquiries were placed in the hands of M. V. Slingerland, assistant entomologist of the Experiment Station. Certain lines of investigation made at Ithaca were placed in immediate charge of Michael Barker, who was secured from the Botanic Gardens of Harvard University. We also associated with us for a time in certain field work, Harold G. Powell, a senior in agriculture in Cornell University, and one who had had much experience in pomological matters.

In 1895 the work was placed under the supervision of Professor I. P. Roberts, the director of the station (who was absent the previous year) and Professor Bailey, but immediate charge of it was given, as the year before, to the latter officer. Some additional help was secured because of the larger work which was demanded by the larger appropriation ; but in general the enterprise went forward upon the same lines as in 1894.

A third appropriation was made by the legislature of 1896 of \$16,000; but since the new state constitution had abolished the Fifth Judicial Department, the fund was applied to the Fourth Judicial Department comprising twenty-two counties bounded eastward by Jefferson, Lewis, Herkimer, Oneida, Onondaga, Cayuga, Tompkins, Seneca, Yates and Steuben.

The legislature of 1897 made a fourth appropriation, but now it applies to the entire state and to agriculture in general. Moreover, it is given to the College of Agriculture (not to the Experiment Station) for "the promotion of agricultural knowledge in the State." For this purpose \$25,000 was appropriated. The attachment of this fund to the general College of Agriculture signalizes the outgrowth of the work from mere experiment (as chiefly contemplated at first) into the general promulgation of agricultural knowledge. With this new bill, the prosecution of the work passed from the hands of Professor Bailey into those of Professor Roberts, the Director of the College of Agriculture.

From the first, the work has been thrown into three general lines,—direct research in the orchards, vineyards and gardens of western New York; teaching by means of itinerant schools and lectures; and the publication of horticultural knowledge in bulletin form. A somewhat full account of the enterprise up to nearly the time when it passed wholly from Professor Bailey's hands may be found in Bulletins 110 and 122. From the funds of the first three years—when the work was restricted to horticulture—49 bulletins have been published, and investigations for several others have been completed. These bulletins have been of five general types: 1. Those which attempt to improve the cultivation of the staple crops; 2. Those which endeavor to expound well known principles and facts; 3. Those which aim to awaken an interest in flowers and nature and the amenities of rural life; 4. Those which suggest new avenues of profit; 5. Those which attempt to monograph certain difficulties (as given insects and fungi) with which the horticulturist has to contend. In all of them, it has been the desire to make the matter attractive and readable, so that the entire bulletin would be prized and kept by the recipient.

The animus of the entire enterprise has been an attempt to

inquire into the agricultural status, to discover the causes of the rural depression, and to suggest means for improving the farmer's position. This attempt has been specifically directed to a single great branch of rural industry, horticulture, in pursuance of the provisions of the law ; but what is true of the horticultural communities is essentially true of other agricultural regions, and, moreover, these two types of agricultural industry cannot be separated by arbitrary lines. The work, therefore, has practically resulted in a broad study of rural economics. We conceive that it is impossible to really extend the Experiment Station and University impulse to the people in such manner that it shall come to them as a living and quickening force, without first studying the fundamental difficulties of the farmers' social and political environment.

In this extension work, therefore, we have sought not so much for new facts as for some way of driving home the old facts. We have tried to set forces at work which would silently extend themselves when we had left them. Fortunately, we have been greatly aided by the hard times and the multitudes of bugs and special difficulties. These things have driven people to thinking and to asking for information. The agricultural communities are thoroughly aroused, and now is the time to teach. When one is thoroughly prosperous in his business, there is little chance—as, in fact, there is generally little need—of teaching him other methods.

The efforts to reach the people, in the progress of our work, may be classified under five general heads. These efforts have all been experiments in methods of extension teaching as applied to horticulture. We have tried to ascertain the value of:

- (1.) The itinerant or local experiment as a means of teaching.
- (2.) The readable expository bulletin.
- (3.) The itinerant horticultural school.
- (4.) Elementary instruction in the rural schools.
- (5.) Instruction by means of correspondence and reading courses.

In the local experimental work, something over one hundred different experiments have been planned and prosecuted in differ-

ent parts of western New York. These comprise experiments in tilling the land, in pruning trees, in fertilizing the soil, spraying, combating insects and fungi, and the like. The fundamental purpose in these experiments is to teach by means of object lessons and not to collect scientific facts, although the latter often come as a very valuable incidental result.

The bulletins which have been issued under the auspices of the work are public and therefore need no explanation at the present time.

The horticultural schools have been about forty in number. These are meetings which last two or more days, at which time certain instructors take up definite lines of instruction, giving by far the greater part of their attention to underlying principles and not to mere facts or methods. A somewhat full report of these horticultural schools, with the topics and instructors assigned to each, is published in Bulletin 122.

The fundamental difficulty with our agricultural condition is that there is no attempt to instruct the children in matters which will awaken an interest in country life. We have therefore conceived that the place in which to begin to correct the agricultural status is with the children and the rural schools. For the purpose of determining just how much could be expected from this source, many rural and village schools were visited during the past year, the instructors talking to the children about any object which presented itself at the time. The result was that all the instructors were impressed with the readiness with which the children imbibed the information, their keen desire for it and appreciation of it, and the almost universal interest which teachers took in this kind of work. We are now convinced that the greatest good which can be rendered to the agricultural communities is to awaken an interest in nature-study on the part of teachers and children. In order to facilitate teaching in this direction, we have issued five leaflets to show teachers how nature-study may be presented to the pupils, and these have been received with the greatest enthusiasm by educators and others amongst our constituency. The hint for this work in the public schools was derived from the work which was done by George T. Powell, in Westchester County,

under the auspices of the New York Committee for the Promotion of Agriculture. This resulted in a virtual union of the forces in the two parts of the State, and when the people asked the Legislature again during the last winter for an appropriation, the Committee for the Promotion of Agriculture lent its influence in behalf of the bill.

The outgrowth of this work with the schools is that we now consider that the best way in which to reach the pupils and the teachers is by short and sharp observations upon plants, insects and other natural objects, and not by means of definite lectures of stated lengths. This work has already been presented to the teachers at some of their institutes, where it has also met with favor and it has received the commendation of the Superintendent of Public Instruction and other persons in authority. *It will, of course, be futile to attempt to instruct the children of the State in nature-study by means of instructors from Cornell University. We therefore conceive that the real work to be done is to instruct the teachers in the methods of imparting this instruction.* It was with this thought that we began a series of teachers' leaflets and we purpose to present the work at the teachers' institutes and eventually, perhaps, in the Normal Schools and training classes of the State. So far as the present outlook is concerned, it is perhaps not too much to say that we believe that this movement, directed towards the young people of the rural communities, is the most important one which has developed in agriculture since the consummation of the experiment station idea.

Instruction by means of correspondence has been an outgrowth of the last year and has not yet been carried to sufficient maturity to enable us to judge of its full merit and promise. However, there were about 1,600 readers upon our lists at the close of the first three months, and there is no doubt but that a vigorous agitation of the question during another winter will at least quadruple our present list. It is the plan in this reading course to set the farmers to reading upon certain definite subjects which are assigned to them, and then to make them think upon those subjects by periodical questioning. At the present time the texts which have been used are our Bulletin 119 upon the Texture of the Soil, and Bulletin 120 upon the

Moisture of the Soil. These are two fundamental subjects upon which every farmer needs more light. After having read one of these bulletins, a printed circular is sent to each reader asking certain definite questions, which it is desired that he shall figure out, think about and answer for himself. In this way the readers are kept in constant touch with the College of Agriculture, and they are made to think, whether they desire to do so or not.

Aside from the many horticultural investigations which are still continuing from Professor Bailey's work, there are now more than 200 experiments with fertilizers on various kinds of crops in progress throughout the State among the farming community. Five hundred experiments in beet culture, with and without fertilizers, are also being conducted to learn, if possible, the localities in the state best adapted to sugar beet culture and to induce the farmers to investigate this new industry. Instruction is given as to soil, methods of tillage and fertilization. At the same time, numerous experiments are being conducted at the university along lines similar to those mentioned. The College of Agriculture has enrolled under the head of University Extension work fifteen thousand pupils and ten thousand teachers of the public schools, and one thousand six hundred young farmers. The pupils and farmers receive guidance by means of printed circulars and the farmers report progress and difficulties upon special blanks which are furnished. Six instructors are employed throughout the state in conducting University Extension work, and special teachers are employed from time to time as occasion requires. These instructors meet the teachers of the public schools in the presence of their pupils and at teachers' associations and institutes for the purpose of illustrating methods for teaching Nature Studies directly or indirectly related to Agriculture. The leaflets furnished serve as text for the subjects taught.

The result of this pushing of the education motive into the rural communities has been a most decided waking up of the rural communities which, even if the work were to stop at the present time, would continue to exert an influence for a generation and more.

All this work has been experimental,—an attempt to discover

the best method of teaching the people in agriculture. We believe that the most efficient means of elevating the ideals and practice of the rural communities are as follows, in approximately the order of fundamental importance: (1) The establishment of nature-study or object-lesson study, combined with field-walks and in incidental instruction in the principles of farm-practice, in the rural schools; (2) the establishment of correspondence-instruction in connection with reading-courses, binding together the University, the rural schools, and all rural literary or social societies; (3) itinerant or local experiment and investigation, made chiefly as object-lessons to farmers and not for the purpose, primarily, of discovering scientific facts; (4) the publication of reading bulletins which shall inspire a quickened appreciation of rural life, and which may be used as texts in rural societies and in the reading courses, and which shall prepare the way for the reading of the more extended literature in books; (5) the sending out of special agents as lecturers or teachers, or as investigators of special local difficulties, or as itinerant instructors in the normal schools and before the training classes of the teachers' institutes; (6) the itinerant agricultural school, somewhat after the plan of our horticultural schools, which shall be equipped with the very best teachers and which shall be given as rewards to the most intelligent and energetic communities.

In conclusion, it must be said that the farmers, as a whole, are willing and anxious for education. They are difficult to reach because they have not been well taught, not because they are unwilling to learn. It is astonishing, as one thinks of it, how scant and poor has been the teaching which has even a remote relation to the tilling of the soil; and many of our rural books seem not to have been born of any real sympathy with the farmer or any proper appreciation of his environments. Just as soon as our educational methods are adapted to the farmer's needs, and are born of a love of farm life and are inspired with patriotism, will the rural districts begin to rise in irresistible power.

CIRCULAR CONCERNING

Co-Operative Tillage Experiments.

No. 5.

**Cornell University,
College of Agriculture.**

Ithaca, N. Y., April 15, 1897.

It is desired by the Cornell University College of Agriculture to co-operate with farmers throughout the State in tillage experiments with potatoes and sugar beets. Such marked results have been obtained by the Experiment Station at Cornell University in the tillage of potatoes that it is considered worth while to see if equally marked results cannot be secured by the farmers generally throughout the State. The awakening interest in the home manufacture of sugar and the organization in this State of one or more companies for its manufacture from beets, demand that attention be given to the subject of the culture of sugar beets, and the fertilizers, soil and varieties best suited to their production in different sections of the State.

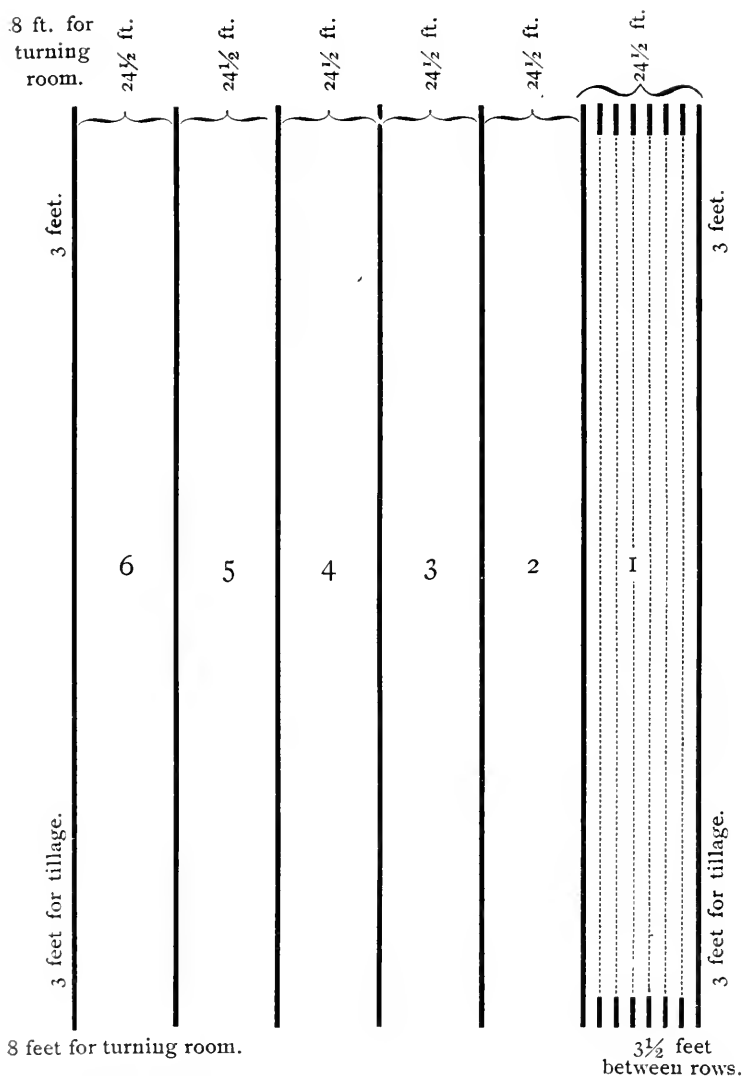
To assist in carrying out this work we invite the co-operation of all farmers interested, and for those who desire to enter upon this work the following details are given :

Potato Tillage Experiments.

Select, if possible, a loamy soil avoiding light sands or heavy clay. If a clover sod can be plowed under it will serve the purpose well, but heavy, tenacious sods should be avoided. Select a place on which the soil is uniform in quality and all portions of which have been treated alike as regards cropping and ma-

nuring. Plow immediately, or as early as the condition will permit, and measure off the plats which are to be devoted to the experiment. It is desired that this be an experiment to determine the effect of tillage upon potatoes, and the following suggestions as to size and number of plats are given to aid the farmer in carrying out the purpose of this work. (See diagram.) Measure off a piece of land $207\frac{1}{2}$ feet long and 147 feet wide. (A space of at least three feet should be allowed outside of the outer rows, indicated by the outside solid black lines, so that cultivation may be given to both sides of the potato rows. This will give the total width over all of an additional 6 feet or 153 feet.) Divide this up into six plats, each $24\frac{1}{2}$ feet wide and $207\frac{1}{2}$ feet long. This will provide for six rows of potatoes $3\frac{1}{2}$ feet apart to each plat, and will leave a space of $3\frac{1}{2}$ feet between the outside experiment rows and the edge of the plats. A space of seven feet will be left between the adjacent rows of the plats, and in this space there should be a row of potatoes planted which is to be dug before the other six rows on the plat are harvested. This extra row is indicated by the solid black lines in the diagram, and the rows of potatoes which are to enter into the experiment are indicated by the dotted lines. Planted in this way there will be one-tenth of an acre of potatoes to each plat. If it is desired to have the plats only half the size of the ones shown in the diagram, then instead of making them $207\frac{1}{2}$ feet long, make them only half that length or 103 feet 9 inches long and the width the same, $24\frac{1}{2}$ feet, and plant the rows the same distance apart as indicated above, $3\frac{1}{2}$ feet. This will give plats of one-twentieth of an acre each. If the circumstances are such that it seems desirable to have the rows of greater length and not have the plats definitely marked off, as in the diagram, it may be done by so measuring the rows that a total of 1,245 feet in each plat shall be subject to the special tillage desired. This will give a potato area of one-tenth of an acre. If the smaller area of one-twentieth of an acre is preferred then have a total length of rows in each plat of $622\frac{1}{2}$ feet. Where the plan of the diagram can be followed it is recommended so that there may be as great a uniformity of methods and results as possible. Eight additional feet should be allowed

DIAGRAM FOR POTATO PLATS.



Plats 207½ ft. long; 24½ ft. wide.
Six rows of potatoes to the plat.

Plat 1—3 cultures.
" 2—6 cultures.

Plat 3—9 cultures.
" 4—3 cultures.

Plat 5—6 cultures.
" 6—9 cultures.

at each end of the plats for turning room, making the total length of the potato rows $223\frac{1}{2}$ feet, so that during tillage that portion which is to enter into the experiment will not be injured by the tramping of horses in turning. At time of digging, eight feet at each end and the extra rows planted between plats (indicated in diagram by the solid black lines) should be dug and removed before the experiment plats are harvested.

After plowing the land this spring harrow thoroughly, breaking all clods and pulverizing the soil. Open the rows with a shovel, plow or with a double moldboard plow. Cut the potatoes so that there shall be one or two strong eyes to the piece, each piece being of good size, and drop one piece to a place and 14 inches apart in the row. Cover with a hoe to the depth of about four inches. The seed should be uniform and of the same variety. If any traces of scab are present, the potatoes should be soaked before cutting for one hour in solution of two ounces of corrosive sublimate to thirteen gallons of water. This corrosive sublimate is poison and should be handled with extreme care. Prof. J. C. Arthur, of Purdue University Experiment Station, Indiana, recommends for potato scab eight fluid ounces of Commercial Formalin (which can be purchased at the drug store) to fifteen gallons of water. Immerse the potatoes for two hours. This is perfectly safe and said to be thoroughly efficient. Before the potatoes are up, about one week after planting, thoroughly harrow all plats with a spike tooth harrow. If a heavy rain should come after this harrowing and before potatoes are up, use the harrow again on all plats, breaking up the surface soil crust. When potatoes are up so that the rows can be followed, cultivate all plats with a fine tooth implement. A spring-tooth cultivator does the work well. After this first tillage plat 1 is to have but two more cultures, plat 2 five more and plat 3 eight more. Repeat with plats 4, 5 and 6. All this is to be level culture and no hilling up. Plats will then receive tillage as follows:

Plat 1—3 cultivations.		Plat 4—3 cultivations.	
“ 2—6	“	“ 5—6	“
“ 3—9	“	“ 6—9	“

The foliage on all plats must be kept intact by spraying if necessary. To prevent the attacks of the leaf flea-beetle and the blight use Bordeaux mixture, and for the common potato beetle, Paris-green. (See Cornell Bulletin 130.)

If it is desired to conduct fertilizer experiments in connection with this tillage experiment, the additional plats required may be laid off the same size and the fertilizer applied according to directions given by Dr. Caldwell. (See Cornell Bulletin 129.) It is hoped that, in addition to the potato tillage experiment outlined above, every farmer will arrange for one or more additional plats on which to carry out his own idea of potato raising. Have one plat which shall have the potatoes hilled up in the ordinary way of hilling potatoes.

RECORD OF POTATO EXPERIMENT, 1897.—TO BE RETURNED
AT THE END OF THE SEASON TO CHIEF CLERK, COL-
LEGE OF AGRICULTURE, ITHACA, N. Y.

Name of Experimenter.....

Post Office.....

County.....

Kind of soil.....

Previous treatment of land.....

Date of plowing.....

Manner of fitting land.....

Size of plats.....

Name of variety planted.....

Date of planting.....

Dates of harrowing.....

Plat 1 :

Date of first tillage.....
Date of second tillage
Date of third tillage.....
Date of digging
Weight of marketable potatoes.....
Weight of small potatoes

Remarks:

Dates of spraying
Rainfall
Kind of implement used in tilling, etc.....

Plat 2 :

Date of first tillage.....
Date of second tillage
Date of third tillage.....
Date of fourth tillage
Date of fifth tillage
Date of sixth tillage
Date of digging.....
Weight of marketable potatoes.....
Weight of small potatoes

Remarks:

Plat 3 :

Date of first tillage
 Date of second tillage
 Date of third tillage
 Date of fourth tillage
 Date of fifth tillage
 Date of sixth tillage
 Date of seventh tillage
 Date of eighth tillage
 Date of ninth tillage
 Date of digging
 Weight of marketable potatoes
 Weight of small potatoes

Remarks :

Plat 4 :

Date of first tillage
 Date of second tillage
 Date of third tillage
 Date of digging
 Weight of marketable potatoes
 Weight of small potatoes

Remarks :

Plat 5 :

Date of first tillage.....
 Date of second tillage.....
 Date of third tillage.....
 Date of fourth tillage.....
 Date of fifth tillage
 Date of sixth tillage
 Date of digging.....
 Weight of marketable potatoes.....
 Weight of small potatoes

Remarks :

Plat 6 :

Date of first tillage.....
 Date of second tillage
 Date of third tillage.....
 Date of fourth tillage
 Date of fifth tillage
 Date of sixth tillage.....
 Date of seventh tillage
 Date of eighth tillage
 Date of ninth tillage
 Date of digging.....
 Weight of marketable potatoes.....
 Weight of small potatoes

Remarks :

EXTRA PLATS FOR SPECIAL EXPERIMENT ON HILLING.

State fully the treatment given and the weight of marketable and small potatoes harvested.

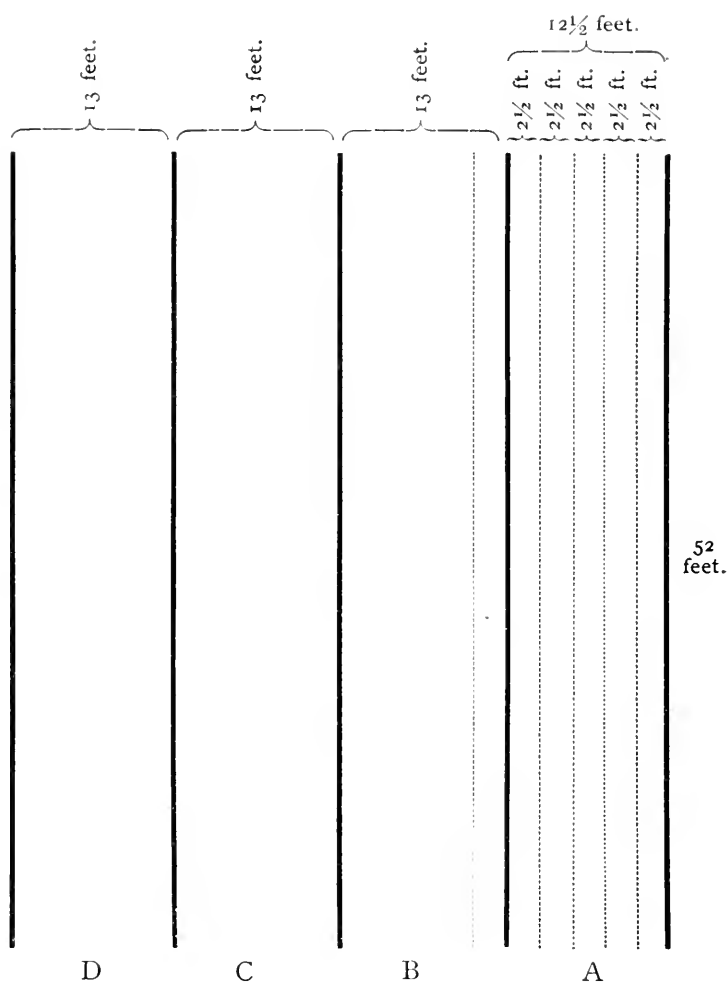
Sugar Beets—Tillage Experiment.

Enough sugar beet seed will be sent by the Cornell University Experiment Station to plant one-twentieth of an acre. All who wish to co-operate in the experiment are requested to write for seed, which will be distributed as long as the supply lasts.

It is desired that the plats be laid off as follows (See Sugar Beet diagram). Measure off an area 52 feet long and 50 feet wide. In plowing add $2\frac{1}{2}$ feet to each side, making the total area to be plowed 57 by 55 feet. This additional area to be plowed is for the purpose of giving room for tillage on the outside of the outer row. Stake off four plats each $12\frac{1}{2}$ feet wide and 52 feet long. This will provide for four rows of beets to the plat (indicated by the dotted lines) and an extra row between and outside of plats (indicated by solid black lines). These extra rows are not to enter into the experiment and are to be harvested and removed before the regular four rows of the experiment (indicated by dotted lines) are harvested.

The following directions regarding sugar beet culture may be found helpful. An open-porous soil, not over sandy, should be selected avoiding heavy clay subsoils or hardpan. While the soil should be fertile yet fresh barn manure should not be applied. Where it is desired to fertilize with barn manure it should be

SUGAR BEET DIAGRAM.



Four plats 52 feet long ; 12½ feet wide, 4 rows to plat, 2½ feet between rows. Area of each plat, $\frac{1}{80}$ acre.

applied and plowed under in the fall. Muck or bottom land soils while they might produce a large amount of beets, yet the percentage of sugar would probably be low. Select well drained upland, loamy soil or one with a fairly porous subsoil. This will enable the beet to expand evenly and produce a smooth, regularly developed root. Plow deep and early, harrow once and then allow the land to remain without being disturbed for a few days. This is to permit whatever weed seed may be in the soil to sprout before planting the beets. Then harrow again thoroughly and if heavy rains have packed the soil, make it loose again with a cultivator or by shallow gang plowing. After fining and pulverizing with the harrow use the roller and follow the roller with a light, fine tooth harrow. This fitting should be done just previous to planting the seeds.

Mark off the rows by stretching a line across the plats, rows to be $2\frac{1}{2}$ feet apart. (See diagram for beets.) The two packages of beet seed sent are sufficient to plant four plats of the dimensions given in the diagram. Planting in this latitude may usually be done from the first to the middle of May. Cover the seed to a depth of about one inch and firm the earth over the rows by means of a rake, leaving it firm but not packed smoothly.

If weeds and grass start before the beets are up then hand work must be resorted to, for it is absolutely essential that the weeds be kept in check and the easiest way to do this is to check them at the start. Should heavy rains cause a surface soil crust to be formed, this crust must be broken up either by using a rake or some light implement similar to a Breed's weeder. As soon as the rows can be followed horse tillage should commence, the implement used being one with many fine teeth (similar to one shown in frontispiece of Cornell Bulletin 130).

This experiment is one of tillage alone. (The fertilizer experiments are described by Dr. Caldwell in Bulletin 129.) As soon as the rows can be followed give all plats tillage with the fine tooth implement. After the first time the tillage of the plats is to vary in frequency. Plats A and C (see diagram) are to receive tillage about every seven days and plats B and D only about every fourteen days, so that every other time all plants

will receive tillage. If weeds or grass appear in the row they must be removed by hand.

Thinning should be done as soon as four leaves are formed. This work must not be delayed until the plants become of considerable size or the roots will so interlace that injury will be done to the ones we wish to leave. In thinning large areas the work is done by chopping out with a hoe, leaving a bunch every nine inches, and then thinning out the bunch by hand. On these small plats the thinning would better all be done by hand. Leave a strong, vigorous plant every nine or ten inches. Press the earth firmly around the plants left but do not hill up. The pressure should not be great enough to injure the cells of the plant.

Harvesting should be done before heavy frost. It also should be done before the tops begin making a second growth. The samples selected to be sent to Cornell University for analysis should be of medium size, not the largest nor smallest but a good average of the lot. The rows indicated in the diagram by the solid black lines should be harvested before the main plats and the beets removed. Then harvest and weigh each plat of four rows. Take as a sample, five average sized beets, put them in a sack and put in the sack with them the record as to culture and yield of the plat. Tie the sack securely and put in a box. In this way take and prepare samples of all the plats, putting in the sack with the sample the record of the plat on which the sample was grown. The following blank form may be used in keeping and reporting the record of the plats:

This is to be returned at the end of the season to CHIEF CLERK, COLLEGE OF AGRICULTURE, Ithaca, N. Y.

Name of Experimenter

Post Office

County

Kind of land
 Previous treatment of land
 Date of plowing
 Manner of fitting
 Date of planting
 Treatment after planting before plants are up.
 Date of first tillage of all plats

PLAT A	PLAT B
(To be tilled about every 7 days.)	(To be tilled one-half as many times as Plat A. About every 14 days.)
<i>Dates of Tilling.</i>	<i>Dates of Tilling.</i>
Date harvested	Date harvested
Weight of beets	Weight of beets
PLAT C	PLAT D
(To be tilled same as A.)	(To be tilled same as B.)
<i>Dates of Tilling.</i>	<i>Dates of Tilling.</i>
Date harvested	Date harvested
Weight of beets	Weight of beets

I. P. ROBERTS, Director.

L. A. CLINTON, Asst. Agriculturist.

CIRCULAR CONCERNING
Co-Operative Tillage Experiments.

No. 6.

Cornell University,
College of Agriculture.

Ithaca, N. Y., April 15, 1897.

**Directions for the Application of the Fertilizers and
Records to be Made.**

Since so many applications have been made for fertilizers to be used in the "Field Experiments," we have limited the size of plats to be experimented upon to $\frac{1}{20}$ of an acre each. We have sent you by freight one large sack containing ten small sacks, each tagged so that you can tell what kind and how much fertilizer each small sack contains.

Pay *no attention* whatever to any printing that may be upon the sacks, but give *strict attention to the tags* that are tied to the bags. The contents of the small sacks are to be applied to the plats as follows:

On Plat **K** put contents of one sack containing 10 pounds Muriate of Potash.

On Plat **N** put contents of one sack containing 10 pounds Nitrate of Soda.

On Plat **KN** put contents of one sack containing 10 pounds Muriate of Potash,
also contents of one sack containing 10 pounds Nitrate of Soda.

On Plat **P** put contents of one sack containing 20 pounds Superphosphate.

On Plat **KP** put contents of sack containing a mixture of 10 pounds Muriate
of Potash and 20 pounds Superphosphate.

On Plat **NKP** put contents of one sack containing 10 pounds Nitrate of Soda,
also contents of sack containing a mixture of 10 pounds Muriate of
Potash and 20 pounds Superphosphate.

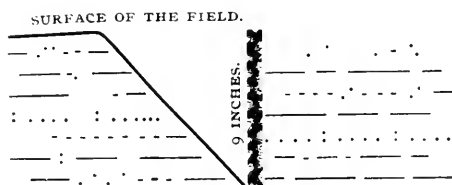
On Plat **NP** put contents of one sack containing 10 pounds Nitrate of Soda,
also contents of one sack containing 20 pounds Superphosphate.

Apply the Muriate of Potash and the Superphosphate before the crops are planted and the Nitrate of Soda later. Do not apply the Nitrate of Soda on the plats requiring it until the crops have been planted and have been up about fifteen days; then apply half of the Nitrate as a surface dressing and three weeks later apply the rest and cultivate in.

For corn, or potatoes and such crops that are to be in hills or rows, throw a furrow each way so as to leave a shallow trench. Put the fertilizers (only the Phosphate or Muriate of Potash, or the mixture of the two) in the bottom of this trench; then cover very lightly. A light, fine toothed cultivator may be used for this. This is to prevent the seed from coming in contact with the concentrated fertilizer, which might be injurious to it. Plant the potatoes, or corn, or whatever the crop is, on top of this covered fertilizer and from this point proceed in the ordinary way.

If fertilizers are applied to grapes, berries, etc., in rows, apply along each side of the rows on the surface, and then cultivate in and mix with the surface soil. For any crop that is sown broadcast, apply the fertilizer broadcast and cultivate in. If fine, well rotted stable manure is used on one plat, spread broadcast after land is plowed and cultivate in. If the manure is coarse, spread broadcast and plow it under. If not plowed under it will be more or less in the way all summer.

Sampling the Soil.



The first thing to do before applying the fertilizer is to get a good average sample of soil from that portion of the field on which the plats are laid out.

Proceed as follows: Sample that portion of the field in from 10 to 15 different places. With a spade with a square end dig a hole, the width of the spade and nine inches deep, leaving one side of the hole vertical and the other side sloping just as in the cut. Clean out all the loose soil at the bottom of the hole; cut off from the vertical side a slice about two inches thick from top

to bottom, the full width of the spade and save this slice to represent one of the partial samples. Pick out all stones larger than $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter.

These 10 to 15 small samples are to be mixed together in a large box or on some clean boards. These several partial samples when mixed will make from 1 to $1\frac{1}{2}$ bushels of soil. Mix thoroughly by stirring and shoveling over and over a number of times; then of this *thoroughly* mixed soil take a sample of *three pecks* and put it into the large sack that held the small sacks of fertilizer. Tie it up tightly and keep until further notice. To be of any use for analysis or experiments at the Experiment Station, this sample *must* represent as accurately as possible the whole area to be divided up into the nine plats, before the fertilizers have been applied.

Make a record as complete as possible of the field according to the following plan:

I—*Location of Field.*

a—Upland.

b—Lowland. (If lowland, do side hills wash down upon it?)

c—Hillside, etc.

II—*Character of Soil.*

a—Sandy.

b—Gravelly.

c—Clayey.

d—Loamy, etc.

e—How deep is surface soil?

f—Is there a hard pan; if so, how deep?

g—Does soil hold moisture, or dry out rapidly?

III—*Fertility of Soil.*

a—Does soil possess the required amount of plant-food or does it “run down” quickly and need enriching?

b—Have manures or fertilizers been applied in past years? If so, how often, what kinds and how often, what kinds and how much per acre?

IV—*History of Crops Previous to 1897.*

What crops have been grown and how much yield per acre in past years? In case of cereals give number of bushels of grain and tons of straw or stalks per acre.

V—*History of Crop for 1897.*

Kind of crop grown.

Date of planting.

Date when crop begins to come up on each plat.

Date when crop is about half up on each plat.

Date when crop is practically all up on each plat.

From time to time keep note of any differences that may appear between the various plats.

SAMPLE RECORD.

- I. c—Hillside.
- II. b—Gravelly.
- III. a—Runs down quickly and needs plant food.
- IV. Pasture for eight years, then two years corn—50 bushels corn per acre and three-fourths ton stalks each year, etc.
- V. Keep notes of time of planting, etc., as suggested in V under History of Crop for 1897.

SUGGESTIONS.

The same kind and same amount of seed is to be sown on each of the series of eight or nine plats in the set. Drive stakes in such a way, and so number the plats that there will be no danger of getting the several plats mixed and so cause confusion. It must be remembered that this experiment is to be tried upon the crop planted and not upon an accidental crop of weeds. In no case will the experiment be of value if the weeds are allowed to grow upon the plats. Thorough cultivation is one of the most important features of the field test.

It will be impossible to send an agent to inspect each series of experiments, but if you become very much confused and do not understand the instructions given, let us know and we will try to help you out either by correspondence or by sending an agent to your place.

APPENDIX II.

Detailed statement of receipts and expenditures of the Cornell University Agricultural Experiment Station, for the fiscal year ending June 30th, 1897.

RECEIPTS.

FROM AGRICULTURAL DIVISION.

1896.				
Nov. 25.	Products sold (Farm)	\$34 00	\$34 00	

FROM HORTICULTURAL DIVISION.

1896.				
July 2.	Sundry fruits	4 55		
Nov. 24.	Sundry fruits	33 07		
1897.				
Jan. 6.	Hauling coal	2 96		
" 6.	Sundry fruits	4 00		
" 15.	Sundry fruits	20 76		
Feb. 6.	Sundry fruits	20 55		
June 23.	Sundry fruits	3 65	89 54	

FROM OFFICE.

1896.				
Nov. 7.	Spray Calendars	2 00		
1897.				
Apr. 5.	Spray Calendars	33 75	35 75	
Grand Total			\$159 29	

EXPENDITURES.

FOR SALARIES.

1896.				
July 31.	I. P. Roberts, Director, 1 mo.	\$125 00		
" 31.	H. H. Wing, Dairyman, 1 mo	104 24		
" 31.	G. F. Atkinson, Botanist, 1 mo	91 74		
" 31.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33		
" 31.	L. A. Clinton, Assistant Agriculturist, 1 mo	83 33		
" 31.	E. A. Butler, Clerk, 1 mo	50 00		
Aug 31.	I. P. Roberts, Director, 1 mo.	125 00		
" 31.	H. H. Wing, Dairyman, 1 mo	104 24		
" 31.	G. F. Atkinson, Botanist, 1 mo	91 74		
" 31.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33		
" 31.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33		
Sept. 30.	I. P. Roberts, Director, 1 mo.	125 00		
" 30.	H. H. Wing, Dairyman, 1 mo	104 00		
" 30.	G. F. Atkinson, Botanist, 1 mo.	91 74		

Amount carried forward \$1,346 02

Amount brought forward			\$1,346 02
Sept.	30.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	30.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
"	30.	E. A. Butler, Clerk, 1 mo.	50 00
Oct.	31.	I. P. Roberts, Director, 1 mo.	125 00
"	31.	L. H. Bailey, Horticulturist, 1 mo.	166 66
"	31.	H. H. Wing, Dairyman, 1 mo.	104 16
"	31.	M. V. Slingerland, Assistant Entomologist, 1 mo.	125 00
"	31.	G. F. Atkinson, Botanist, 1 mo.	91 66
"	31.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	31.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
Nov.	30.	I. P. Roberts, Director, 1 mo.	125 00
"	30.	L. H. Bailey, Horticulturist, 1 mo.	166 66
"	30.	H. H. Wing, Dairyman, 1 mo.	104 16
"	30.	M. V. Slingerland, Assistant Entomologist, 1 mo.	125 00
"	30.	G. F. Atkinson, Botanist, 1 mo.	91 66
"	30.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	30.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
"	30.	E. A. Butler, Clerk, 1 mo.	50 00
Dec.	31.	I. P. Roberts, Director, 1 mo.	125 00
"	31.	L. H. Bailey, Horticulturist, 1 mo.	166 66
"	31.	H. H. Wing, Dairyman, 1 mo.	104 16
"	31.	M. V. Slingerland, Assistant Entomologist, 1 mo.	125 00
"	31.	G. F. Atkinson, Botanist, 1 mo.	66 67
"	31.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	31.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
1897.			
Jan.	31.	I. P. Roberts, Director, 1 mo.	\$125 00
"	31.	L. H. Bailey, Horticulturist, 1 mo.	166 66
"	31.	H. H. Wing, Dairyman, 1 mo.	104 16
"	31.	M. V. Slingerland, Assistant Entomologist, 1 mo.	125 00
"	31.	G. F. Atkinson, Botanist, 1 mo.	83 33
"	31.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	31.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
"	31.	E. A. Butler, Clerk, 1 mo.	50 00
Feb.	28.	I. P. Roberts, Director, 1 mo.	125 00
"	28.	L. H. Bailey, Horticulturist, 1 mo.	166 66
"	28.	H. H. Wing, Dairyman, 1 mo.	104 16
"	28.	M. V. Slingerland, Assistant Entomologist, 1 mo.	125 00
"	28.	G. F. Atkinson, Botanist, 1 mo.	83 33
"	28.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	28.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
Mar.	31.	I. P. Roberts, Director, 1 mo.	125 00
"	31.	L. H. Bailey, Horticulturist, 1 mo.	166 66
"	31.	H. H. Wing, Dairyman, 1 mo.	104 16
"	31.	M. V. Slingerland, Assistant Entomologist, 1 mo.	125 00
"	31.	G. F. Atkinson, Botanist, 1 mo.	83 33
"	31.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33
"	31.	L. A. Clinton, Assistant Agriculturist, 1 mo.	83 33
Apr.	30.	I. P. Roberts, Director, 1 mo.	125 00
"	30.	L. H. Bailey, Horticulturist, 1 mo.	125 00
"	30.	H. H. Wing, Dairyman, 1 mo.	52 08
"	30.	G. F. Atkinson, Botanist, 1 mo.	83 33
"	30.	G. W. Cavanaugh, Assistant Chemist, 1 mo.	83 33

Amount carried forward \$6,756 28

		Amount brought forward	\$6,756 28
Apr.	30.	L. A. Clinton, Assistant Agriculturist, 1 mo	83 33
"	30.	E. A. Butler, Clerk, 1 mo	50 00
May	31.	I. P. Roberts, Director, 1 mo	125 00
"	31.	L. H. Bailey, Horticulturist, 1 mo	125 00
"	31.	H. H. Wing, Dairyman, 1 mo	52 08
"	31.	G. F. Atkinson, Botanist, 1 mo	83 33
"	31.	G. W. Cavanaugh, Assistant Chemist, 1 mo	83 33
"	31.	L. A. Clinton, Assistant Agriculturist, 1 mo	83 33
"	31.	E. A. Butler, Clerk, 1 mo	50 00
June	30.	I. P. Roberts, Director, 1 mo	125 00
"	30.	L. H. Bailey, Horticulturist, 1 mo	125 00
"	30.	H. H. Wing, Dairyman, 1 mo	52 08
"	30.	G. F. Atkinson, Botanist, 1 mo	83 33
"	30.	G. W. Cavanaugh, Assistant Chemist, 1 mo	83 33
"	30.	L. A. Clinton, Assistant Agriculturist, 1 mo	83 33
		Total for Salaries	\$8,043 75

FOR PRINTING.

1896.			
Aug.	31.	W. F. Humphrey, 12,000 copies Bulletin No. 118	\$48 80
"	31.	W. F. Humphrey, 6 additional pages Bulletin No. 117, 12,000	38 40
"	31.	U. S. Express Co., Expressage	25
Sept.	3.	L. V. R. R. Co., Freight	1 12
"	3.	L. V. R. R. Co., Freight	1 07
"	4.	Andrus & Church, 5,000 Cards Printed	7 25
"	8.	L. V. R. R. Co., Freight	2 76
Oct.	12.	Western Union Telegraph Co., Telegram	25
Nov.	7.	L. V. R. R. Co., Freight	56
"	19.	U. S. P. O., Stamps	10 00
Dec.	7.	U. S. Express Co., Expressage	45
"	15.	U. S. Express Co., Expressage	25
1897.			
Jan.	27.	U. S. Express Co., Expressage	80
Feb.	2.	U. S. Express Co., Expressage	1 50
"	10.	U. S. Express Co., Expressage	30
"	16.	L. V. R. R. Co., Freight	11 17
"	16.	L. V. R. R. Co., Freight and Cartage	66
"	16.	L. V. R. R. Co., Freight and Cartage	2 48
"	17.	U. S. Express Co., Expressage	65
"	20.	U. S. Express Co., Expressage	65
"	22.	U. S. Express Co., Expressage	65
"	25.	Franklin Engraving Co., 5 half-tone Cuts	19 75
"	25.	Franklin Engraving Co., 5 half-tone Cuts	18 00
"	26.	U. S. Express Co., Expressage	1 05
Mar.	31.	J. H. McFarland Co., 1 half-tone Cut	3 50
"	31.	H. T. Anthony & Co., 1,500 Negative Prints	3 95
Apr.	8.	L. V. R. R. Co., Freight	93
"	14.	W. F. Humphrey, 20,000 copies Bulletin No. 130	162 20
"	20.	U. S. Express Co., Expressage	70
"	24.	C. W. Sims, Labor	5 00
May	3.	L. V. R. R. Co., Freight and Cartage	61
"	10.	L. V. R. R. Co., Freight and Cartage	1 07

Amount carried forward \$346 78

		Amount brought forward	\$346 78
May	10.	L. V. R. R. Co., Freight and Cartage	1 34
"	25.	L. V. R. R. Co., Freight and Cartage	3 63
Total for Printing			<u>\$351 75</u>

FOR OFFICE EXPENSES.

1896.			
July	1.	E. S. Tichenor, Furniture	\$13 00
"	7.	E. A. Butler, Supplies	65
"	13.	U. S. Express Co., Expressage	55
"	13.	Andrus & Church, Stationery and Supplies	3 90
"	13.	M. A. Adsitt, Stationery	2 50
"	13.	Lovejoy Co., Expressage on Cut	25
"	29.	L. V. Maloney, Labor	40 50
"	30.	Treman, King & Co., Supplies	1 79
"	30.	Western Union Telegraph Co., Telegram	50
Aug.	1.	Andrus & Church, Stationery	1 50
"	3.	Western Union Telegraph Co., Telegrams	16 50
"	20.	Lovejoy Co., 1 half-tone Cut and Postage	5 09
"	20.	Andrus & Church, 1 doz. Pencils	40
"	20.	M. A. Adsitt, Typewriter Ribbon	1 00
"	20.	Ithaca Journal, Envelopes	18 75
"	20.	U. S. P. O., Stamps	10 00
"	31.	L. V. Maloney, Labor	39 00
"	31.	W. C. Bell, Labor	15 00
Sept.	4.	Treman, King & Co., Supplies	90
"	8.	M. A. Adsitt, Typewriter Ribbon and Stationery	2 30
"	15.	U. S. P. O., Stamps	10 00
"	17.	Andrus & Church, Mucilage	1 00
"	21.	Rand, McNally Co., Atlas (2 Vols.)	28 50
"	25.	W. C. Bell, Labor	4 80
"	25.	Andrus & Church, Rubber Bands	25
"	30.	L. V. Maloney, Labor	39 00
"	30.	Andrus & Church, Ink and Pins	20
"	30.	Andrus & Church, Scrap Book	80
Oct.	6.	Andrus & Church, Letter Opener	35
"	16.	E. G. Hance, Cartage	50
"	19.	Andrus & Church, Sundry Supplies	1 67
"	19.	Andrus & Church, Day Book and Ledger	3 30
"	23.	Andrus & Church, Reading Glass	60
"	28.	J. M. Hovey, Labor	1 60
"	29.	Andrus & Church, Bristol-board	48
"	31.	L. V. Maloney, Labor	40 50
"	31.	John Gilmore, Labor	75
"	31.	C. B. Tailby, Labor	2 85
"	31.	G. W. Tailby, Labor	4 10
Nov.	5.	M. A. Adsitt, Letter Book and Delivery	2 90
"	7.	U. S. P. O., Stamps	10 00
"	11.	U. S. Express Co., Expressage	60
"	17.	Wm. J. Campbell, Books	1 50
"	17.	M. A. Adsitt, Stationery	2 20
"	17.	Andrus & Church, Supplies	20
"	18.	M. A. Adsitt, Supplies	1 10
Amount carried forward			<u>\$333 83</u>

		Amount brought forward	\$333 83
Nov.	21.	W. J. Campbell, Book	1 25
"	24.	A. B. Brooks, Sundry Supplies	2 25
"	30.	L. V. Maloney, Labor	37 50
Dec.	7.	Andrus & Church, Stationery	2 23
"	8.	Ithaca Plumbing Co., 6 Chimneys	60
"	15.	Andrus & Church, 5,000 printed Letter Heads	17 50
"	22.	B. F. White, Photographs	25 05
"	23.	U. S. P. O., Stamps	10 00
"	29.	L. V. Maloney, Labor	40 50
"	30.	G. W. Tailby, Labor	70
"	30.	C. B. Tailby, Labor	33
"	30.	A. B. Kennedy, Repairing Clock	1 20
1897.			
Jan.	5.	Western Union Telegraph Co., Telegram	33
"	9.	Andrus & Church, Stationery	2 85
"	12.	Ithaca Gas Co., Gas	2 08
"	12.	Treman, King & Co., Supplies	1 45
"	15.	U. S. P. O., Stamps	10 00
"	15.	Lovejoy Co., Cuts and Engraving	2 28
"	15.	I. P. Roberts, Traveling Expenses	2 25
"	15.	Andrus & Church, Cardboard	1 20
"	16.	L. V. R. R. Co., Freight and Cartage	6 74
"	19.	A. A. A. C. & E. S., Membership Fee	10 00
"	26.	Andrus & Church, Printing 300 Postal Cards	75
"	26.	U. S. Express Co., Expressage	1 50
"	30.	L. V. Maloney, Labor	39 00
Feb.	5.	Western Union Telegraph Co., Telegrams	1 50
"	5.	W. J. Harris, Labor	1 00
"	11.	John Gilmore, Labor	1 65
"	13.	U. S. Express Co., Expressage	80
"	15.	L. V. R. R. Co., Freight and Cartage	62
"	18.	U. S. Express Co., Expressage	40
"	20.	Ithaca Gas Co., Gas	1 12
"	22.	W. H. Carver, Pens	1 50
"	23.	U. S. Express Co., Expressage	55
"	24.	E. G. Hance, Cartage	85
"	25.	Andrus & Church, Supplies	1 75
"	25.	Andrus & Church, Stationery	2 85
"	26.	L. V. Maloney, Labor	36 00
"	27.	C. B. Tailby, Labor	2 79
"	27.	G. W. Tailby, Labor	3 64
"	27.	John Gilmore, Labor	4 05
Mar.	6.	M. A. Adsitt, Supplies	2 20
"	7.	L. V. R. R. Co., Freight and Cartage	5 50
"	8.	M. V. Slingerland, Traveling Expenses	27 95
"	17.	Ithaca Gas Co., Gas	80
"	17.	Andrus & Church, Rule	50
"	17.	Ithaca Stamp Co., Rubber Stamp	2 50
"	18.	W. J. Harris, Sign	5 50
"	18.	I. P. Roberts, Traveling Expenses	16 19
"	29.	Cornell Co-op. Society, Supplies	15 03
"	29.	L. V. Maloney, Labor	40 50
"	31.	G. W. Tailby, Labor	5 12
"	31.	C. B. Tailby, Labor	3 75
Amount carried forward			\$739 98

		Amount brought forward	\$739 98
Mar.	31.	M. A. Adsitt, Sundry Supplies and Stationery	6 55
Apr.	1.	John Gilmore, Labor	14 25
"	5.	U. S. P. O., Stamps	10 00
"	12.	Andrus & Church, Supplies	30
"	21.	Carrie Gaylord, Labor	9 10
"	24.	U. S. P. O., Stamps	10 00
"	30.	L. V. Maloney, Labor	39 00
"	30.	G. W. Tailby, Labor	8 76
"	30.	C. B. Tailby, Labor	5 00
"	30.	L. E. Shanks, Labor	2 85
May	1.	C. H. Howes, Camera and Fixtures	34 90
"	3.	John Gilmore, Labor	12 60
"	4.	S. J. Druskin, Labor	1 50
"	18.	Ithaca Gas Co., Gas	64
"	20.	U. S. P. O., Stamps	10 00
"	22.	Andrus & Church, Stationery	3 75
"	29.	L. V. Maloney, Labor	39 50
June	1.	Wm. McGraime, Labor	1 00
"	3.	Andrus & Church, Stationery	1 75
"	9.	M. A. Adsitt, Note Books	1 50
"	12.	Co-op. Society, Sundry Supplies	5 93
"	14.	Lucy Custis, Labor	10 88
"	15.	Carter Ink Co., 4 Ribbons	4 50
"	19.	Andrus & Church, Supplies	40
"	19.	M. Gaylord, Labor	3 45
"	23.	M. A. Adsitt, Stationery	1 20
"	23.	John Gilmore, Labor	8 40
"	29.	L. V. Maloney, Labor	38 50
"	30.	Andrus & Church, 2 M Envelopes	2 90
Total for Office Expenses			\$1,029 09

FOR AGRICULTURAL DIVISION.

1896.			
July	17.	White & Burdick, Chemicals	1 80
"	20.	Andrus & Church, Sundry Supplies	1 85
"	21.	U. S. Express Co., Expressage	90
"	24.	Andrus & Church, Supplies	12 75
"	29.	Treinan, King & Co., Supplies	4 80
"	31.	B. F. White, Photographs	10 50
Aug.	3.	Fuertes Pharmacy, Chemicals	8 06
"	20.	Driscoll Bros. & Co., Lime	1 50
"	20.	J. W. Hills, Lantern Slides	18 50
"	31.	A. T. Stout, Labor	40
"	31.	C. B. Tailby, Labor	1 60
"	31.	G. W. Tailby, Labor	3 01
"	31.	C. W. Sims, Labor	29 70
"	31.	H. W. Badger, Labor	13 24
"	31.	J. Shimada, Labor	31 63
Sept.	3.	L. V. R. R. Co., Freight	2 71
"	3.	D. L. & W. R. R. Co., Freight and Cartage	60
"	8.	O. A. C. Agr. College, Wheat	2 90
"	14.	U. S. P. O., Stamped Envelopes	21 60
"	26.	L. V. R. R. Co., Freight and Cartage	4 18
"	30.	A. T. Stout, Labor	2 88
Amount carried forward			\$175 11

		Amount brought forward	\$175 11
Sept.	30.	L. Harrington, Labor	10 47
"	30.	C. B. Tailby, Labor	2 70
"	30.	G. W. Tailby, Labor	2 73
Oct.	3.	U. S. Express Co., Expressage	75
"	19.	White & Burdick, Chemicals	2 55
"	24.	L. V. R. R. Co., Freight	45
"	29.	Treman, King & Co., Tape Line	1 25
"	30.	Syracuse Pottery Co., Pots and Saucers	9 00
"	31.	G. S. Hall, Pig	15 00
"	31.	L. Harrington, Labor	21 00
"	31.	S. Raub, Labor	16 50
"	31.	A. J. Briggs, Labor	6 15
"	31.	John Gilmore, Labor	4 58
"	31.	J. Shimada, Labor	3 75
"	31.	National Express Co., Expressage	3 05
Nov.	5	Tremen, King & Co., Twine	25
"	5.	L. Roesch, Grape Cuttings	1 07
"	7.	L. V. R. R. Co., Freight and Cartage	1 18
"	9.	Enz & Miller, Stationery	2 37
"	28.	L. V. R. R. Co., Freight and Cartage	1 59
"	30.	Theodore VanAtta, Labor	35 87
"	30.	S. Raub, Labor	21 75
"	30.	L. Harrington, Labor	21 00
"	30.	A. J. Briggs, Labor	7 20
"	30.	G. W. Tailby, Labor	1 95
"	30.	C. B. Tailby, Labor	1 53
"	30.	John Gilmore, Labor	4 95
Dec.	1.	U. S. Express Co., Expressage	1 60
"	7.	Andrus & Church, 1 M Letter Heads	4 75
"	7.	I. P. Roberts, Traveling Expenses	17 70
"	8.	L. V. R. R. Co., Freight and Cartage	1 12
"	14.	Protection Manufacturing Co., Chemicals	7 50
"	"	Cotte & Gliemann, Palm Nut Meal	12 59
"	16.	J. Slight, Potatoes	3 30
"	16.	Tice & Lynch, Ocean Freight and Cartage	12 20
"	29.	J. Miller, Potatoes	3 95
"	29.	E. McGillivray, Dry Plates	1 80
1897.			
Jan.	1.	J. E. Slight, Potatoes	4 41
"	6.	Fuestes Pharmacy, Chemicals	3 75
"	12.	L. V. R. R. Co., Freight and Cartage	4 30
"	23.	J. H. Van Ness, Artichokes	50
"	30.	G. W. Tailby, Labor	1 72
"	30.	A. J. Briggs, Labor	3 90
Feb.	27.	A. J. Briggs, Labor	4 20
"	27.	M. Raub, Labor	3 00
Mar.	7.	George Small, Lumber	1 24
"	11.	M. F. Webster, Labor	1 00
"	13.	D. M. Osborne & Co., Casting	25
Apr.	14.	H. C. Troy, Labor	16 70
"	26.	U. S. Express Co., Expressage	45
"	27.	Treman, King & Co., Rubber Belting	1 43
"	27.	J. M. Thorburn & Co., Grass Seed	1 17
"	29.	U. S. Express Co., Expressage	70
Amount carried forward			\$490 98

		Amount brought forward	\$490 98
Apr.	30.	L. C. Anderson, Labor	6 40
"	30.	John Gilmore, Labor	75
May	1.	Campbell & Wood, Brick	39 00
"	1.	Treman, King & Co., Supplies	60
"	1.	L. J. Farmer, Strawberry Plants	2 25
"	1.	L. F. Noxon, Garden Seeds	3 80
"	10.	L. V. R. R. Co., Freight and Cartage	1 36
"	24.	H. C. Troy, Labor	16 60
June	3.	Peter Henderson, Garden Seeds	5 10
"	3.	Godfrey & Gilbert, Repairs	6 72
"	7.	Horace Atwood, Labor	32 00
"	8.	L. Anderson, Labor	16 00
"	12.	W. C. Wisser, Fancy Cheese	6 68
"	15.	L. F. Noxon, Seeds	12 95
"	18.	F. Cramer, Labor	7 50
"	21.	B. F. White, Photographs	7 33
"	24.	G. R. Chamberlain, Labor	1 60
"	30.	Theodore VanAtta, Labor	37 00
Total for Agricultural Division			<u>\$694 02</u>

FOR HORTICULTURAL DIVISION.

1896.			
July	6.	D. Gallagher, Labor	2 85
"	6.	William Cunningham, Labor	2 85
"	17.	A. A. Terrill & Co., Repairing Roof of Barn	45 64
"	18.	Ira Grover, Hay	11 28
"	21.	W. H. Morgan, Labor	3 48
"	21.	C. T. Stephens, Seeds	1 90
"	21.	Peter Henderson, Seeds	20
"	21.	Pitcher & Manda, Seeds	15
Aug.	1.	Ira Grover, Labor	37 00
Sept.	2.	Ira Grover, Labor	37 50
"	16.	M. G. Kains, Traveling Expenses	7 79
"	16.	C. E. Hunn, Traveling Expenses	12 50
"	16.	W. Miller, Traveling Expenses	17 10
"	26.	Peter Henderson, Seeds	50
"	26.	D. M. Ferry & Co., Seeds	22
"	26.	W. W. Rawson & Co., Seeds	25
"	26.	W. A. Manda, Seeds	10
"	26.	J. C. Vaughn, Seeds	25
Oct.	1.	Ira Grover, Labor	37 50
"	3.	F. Ellis, Hay	12 53
"	19.	H. A. Dreer, Mushroom Spawn	6 50
"	19.	Hawkins & Todd, Dry Goods	16 19
"	19.	Slocum & Taber, Sundry Supplies	13 38
"	19.	C. T. Stephens, Grass Seed	1 35
"	19.	A. J. Calkins, Harness Repairs	2 20
"	19.	Fall Creek Milling Co., Feed and Bran	16 71
"	19.	White & Burdick, Chemicals	4 65
"	19.	Andrus & Church, Sundry Supplies	19 75
"	19.	J. M. Thorburn & Co., Seeds	6 00
"	21.	Burns Bros., Horse Shoeing	11 15
"	23.	Fall Creek Milling Co., Feed and Bran	7 68
Amount carried forward			<u>\$337 15</u>

		Amount brought forward	\$337 15
Oct.	23.	C. J. Rumsey, Sundry Supplies	57 51
"	26.	J. M. Thorburn & Co., Seeds	3 00
"	27.	H. Cannell & Sons, Seeds	71
"	27.	L. Roesch, Seeds	65
Nov.	2.	Ira Grover, Labor	37 50
"	4.	L. V. R. R. Co., Freight and Cartage	1 66
"	5.	Burns Bros., Horse Shoeing	1 50
"	17.	E. & H. T. Anthony, Photographic Supplies	5 56
"	28.	W. B. Schutt, Hay	10 39
"	30.	U. S. Dept. Agr, 200 Index Cards	2 00
Dec.	2.	Ira Grover, Labor	37 50
"	7.	Danmann & Co., Seeds	33
"	10.	E. & H. T. Anthony, Chemicals	1 77
"	12.	L. V. R. R. Co., Freight and Cartage	1 47
1897.			
Jan.	9.	Rothschild Bros., Supplies	90
"	9.	Ira Grover, Labor	37 50
"	9.	J. B. Freese, Straw	10 55
"	12.	J. B. Todd, Chemicals	1 95
"	16.	J. Reidy & Co., Supplies	13 33
"	23.	Syracuse Supply Co., Steel Stamp	2 50
"	23.	Burns Bros., Horse Shoeing	2 30
"	23.	J. A. Salzer & Co., Seeds	50
"	26.	J. M. Thorburn & Co., Seeds	3 98
"	26.	Eimer & Amend, Chemicals	6 03
"	26.	Pritchard & Son, Wagon Repairs	11 95
"	29.	Salem Twist, Team	200 00
Feb.	2.	Ira Grover, Labor	37 50
"	13.	George Small, Lumber	10 03
"	16.	L. V. R. R. Co., Freight and Cartage	2 14
"	18.	D. L. & W. R. R. Co., Freight and Cartage	45
"	20.	C. U. Repair Dept., Repairs	9 00
"	25.	Burns Bros., Horse Shoeing	4 70
"	25.	J. M. Thorburn & Co., Seeds	86
"	25.	Fall Creek Milling Co., Feed and Bran	7 45
"	25.	A. A. Ricksecker, Plants	1 10
"	25.	Driscoll Bros. & Co., Building Material	7 27
"	25.	J. B. Lang, Repairing Engine	1 56
"	25.	State Veterinary College, Medicine	1 10
"	26.	O. Mitchell, Oats	12 89
"	26.	E. Prestwick, Hay	27 97
Mar.	2.	U. S. Dept. Agr., 200 Index Cards	2 00
"	3.	Ira Grover, Labor	37 50
"	4.	Rubber Stamp Works, Stamp	78
"	4.	Burns Bros., Horse Shoeing	2 40
"	4.	Syracuse Pottery Co., Crockery	4 40
"	17.	Teed & Trench, Horse Blankets	5 00
"	20.	L. V. R. R. Co., Freight and Cartage	1 46
Apr.	3.	Ira Grover, Labor	37 50
"	6.	D. L. & W. R. R. Co., Freight	55
"	14.	B. Chase, Pot Labels	3 30
"	17.	R. R. Co., Freight and Cartage	1 24
"	20.	Scoville & Adams, Supplies	8 02
"	20.	U. S. Express Co., Expressage	60

Amount carried forward \$1,018 96

		Amount brought forward	\$1,018 96
May	1.	C. J. Rumsey & Co., Supplies	41 90
"	3.	Ira Grover, Labor	37 50
"	4.	J. M. Preswick, Oats	23 13
"	5.	Driscoll Bros. & Co., Cement	1 00
"	10.	U. S. Express Co., Expressage	1 20
"	10.	L. V. R. R. Co., Freight and Cartage	2 60
"	18.	U. S. Express Co., Expressage	35
June	2.	Ira Grover, Labor	37 50
"	3.	F. E. Britton, Labor	90
"	3.	C. J. Rumsey, Glass	17 40
"	21.	C. J. Rumsey, Supplies	86 60
"	23.	C. J. Rumsey, Supplies	28 66
"	23.	A. J. Calkins, Harness Repairs	2 20
"	30.	Ira Grover, Labor	37 50
"	30.	Andrus & Church, Stationery	5 75
Total for Horticultural Division			\$1,343 15

FOR CHEMICAL DIVISION.

1896.			
July	3.	J. K. Haywood, Labor	31 35
"	20.	Fuertes Pharmacy, Chemicals	66
Aug.	1.	J. K. Haywood, Labor	56 25
Sept.	3.	J. K. Haywood, Labor	54 90
Oct.	2.	Bush and Dean, Supplies	75
"	3.	J. K. Haywood, Labor	42 45
"	19.	E. B. Holcomb, Labor	4 50
"	31.	J. K. Haywood, Labor	22 05
"	31.	J. P. Troy, Towels	75
Nov.	27.	G. C. Caldwell, Traveling Expenses	23 35
Dec.	11.	Treman, King & Co., Belting	75
1897.			
Jan.	9.	Treman, King & Co., Supplies	46 35
Feb.	1.	B. S. Cushman, Labor	8 40
Mar.	24.	B. S. Cushman, Labor	6 00
June	14.	Cornell Univ. Chemical Dept., Supplies	144 45
Total for Chemical Division			\$442 96

FOR BOTANICAL DIVISION.

1896.			
July	1.	White & Burdick, Supplies	2 70
"	7.	G. E. Stechert, Publications	22 71
"	7.	Reed & Montgomery, Book Binding	1 00
"	17.	Dr. C. L. Anderson, Collection of Plants	10 00
"	27.	U. S. Express Co., Expressage	25
"	29.	C. F. Libbie & Co., Supplies	5 25
"	29.	Andrus & Church, Rubber Bands	15
"	29.	Cambridge Supply Co., Botanical Case	15 00
"	29.	Platt Drug Co., Chemicals	1 25
Aug.	10.	National Express Co., Expressage	35
Sept.	14.	U. S. Express Co., Expressage	25
Oct.	2.	Richards & Co., Chemicals	7 10
Amount carried forward,			\$66 01

		Amount brought forward	\$66 01
Oct.	2.	G. E. Stechert, Publications	1 74
"	2.	Andrus & Church, Stationery	6 25
"	2.	White & Burdick, Chemicals	5 18
"	2.	Bush & Dean, Muslin	1 15
"	2.	Bausch & Lomb, Microscopic Supplies	7 05
"	2.	Eimer & Amend, Microscopic Supplies	10 00
"	6.	National Express Co., Expressage	35
Nov.	11.	U. S. Express Co., Expressage	80
"	17.	Rochester Optical Co., Photographic Supplies	29 88
"	17.	J. Carbutt, Microscopic Supplies	4 25
"	17.	Bausch & Lomb, Camera	3 00
"	18.	Bertha Stoneman, Labor	9 40
Dec.	7.	Dr. C. L. Anderson, Collection of Plants	10 00
"	7.	E. Steigler & Co., Models	45 53
"	7.	Eimer & Amend, Chemicals	4 60
"	10.	Rothschild Bros., Fruit Jars	5 81
"	10.	Bausch & Lomb, Chemicals	1 69
"	23.	Enz & Miller, Paper	6 13
"	23.	Bausch & Lomb, Botanical Supplies	25 50
"	23.	White & Burdick, Chemicals	7 90
"	23.	E. McGillivray, Photographic Supplies	32 32
"	23.	Rochester Optical Co., Photographic Supplies	10 20
"	23.	J. B. McAllister, Meat for Experiment Purposes	6 05
1897.			
Jan.	12.	J. Carbutt, Photographic Supplies	7 23
"	12.	Bausch & Lomb, Mirror	40
"	12.	Bausch & Lomb, Filter	3 00
Feb.	12.	U. S. Express Co., Expressage	70
"	20.	E. Steigert & Co., Publications	6 37
"	20.	G. E. Stechert, Publications	92
"	20.	G. F. Atkinson, Traveling Expenses	17 75
"	25.	G. E. Stechert, Publications	10 60
"	25.	E. A. Allen, Publications	20 09
"	27.	B. Fink, Lichens	1 16
Mar.	6.	Bool Co., Furniture	15 50
"	17.	White & Burdick, Chemicals	7 84
"	29.	Bausch & Lomb, Microscopic Supplies	1 53
Apr.	20.	U. S. Express Co., Expressage	25
"	27.	Eimer & Amend, Microscope and Fixtures	109 52
May	7.	B. Stoneman, Labor	9 00
June	4.	B. Stoneman, Labor	4 75
"	15.	White & Burdick, Chemicals	8 09
"	15.	J. M. Thorburn & Co., Seeds	2 85
"	15.	Cambridge Supply Co., Publications	6 00
"	19.	G. E. Stechert, Publications	3 54
"	19.	B. F. White, Photographic Supplies	50 75
"	19.	Bool Co., Furniture	75 48
Total for Botanical Division			\$664 11

FOR ENTOMOLOGICAL DIVISION.

1896.			
July	6.	Wm. Menzel & Co., Chemicals	2 91
"	11.	M. V. Slingerland, Traveling Expenses	3 30
Amount carried forward			\$6 21

		Amount brought forward	\$6 21
July	13.	E. McGillivray, Photographic Supplies	6 79
"	13.	A. B. Kennedy, Supplies	1 25
"	13.	J. B. Todd, Chemicals	1 63
"	24.	Treman, King & Co., Lime	95
"	24.	Andrus & Church, Stationery	50
"	29.	Treman, King & Co., Supplies	4 93
"	29.	Jamieson & McKinney, Rubber Hose and Fixtures	4 20
"	29.	Treman, King & Co., Supplies	1 55
"	29.	A. B. Brooks, Chemicals	6 98
"	31.	P. Henderson, Seeds	77
"	31.	W. A. Slingerland, Labor	24 00
Aug.	4.	Western Union Telegraph Co., Telegrams	6 42
"	20.	Andrus & Church, Stationery	1 20
"	20.	Bool Co., Curtains	1 20
"	20.	E. McGillivray, Photographic Supplies	2 52
"	31.	White & Burdick, Chemicals	64
"	31.	W. A. Slingerland, Labor	24 00
Sept.	8.	Andrus & Church, Stationery	6 00
"	8.	Treman, King & Co., Ash Can	2 15
"	9.	M. V. Slingerland, Express	30
"	14.	Bausch & Lomb, Repairs	29
"	28.	National Express Co., Expressage	25
Oct.	1.	W. A. Slingerland, Labor	20 85
"	3.	U. S. Express Co., Expressage	50
"	6.	G. Cramer, Photographic Supplies	8 68
"	8.	U. S. Express Co., Expressage	2 15
"	12.	E. McGillivray, Photographic Supplies	2 70
"	17.	National Express Co., Expressage	25
"	29.	Bausch & Lomb, Photographic Supplies	56
"	31.	National Express Co., Express	25
"	31.	W. A. Slingerland, Labor	10 00
Nov.	18.	Rothschild Bros., Lamp	1 97
"	18.	Peter Henderson, Plants	4 70
"	21.	U. S. Express Co., Expressage	90
Dec.	1.	W. A. Slingerland, Labor	11 40
"	7.	D. B. Stewart & Co., Oil	4 32
"	9.	Taylor & Preswick, Stationery	1 00
"	10.	C. U. Dept. of Repairs	89
"	23.	Treman, King & Co., Supplies	2 23
"	23.	C. U. Dept. of Repairs, Repairs	5 33
"	23.	E. McGillivray, Photographic Supplies	3 45
"	31.	W. A. Slingerland, Labor	14 25
1897.			
Jan.	6.	Andrus & Church, Stationery	1 55
"	6.	E. McGillivray, Photographic Supplies	1 75
"	12.	Andrus & Church, Stationery	50
"	13.	M. V. Slingerland, Labor	2 70
"	26.	W. A. Slingerland, Labor	14 55
Feb.	11.	L. Lauren, Labor	11 25
"	25.	M. V. Slingerland, Express	1 50
"	25.	Taylor & Preswick, Typewriter Ribbon	75
"	27.	W. A. Slingerland, Labor	16 50
Mar.	6.	Andrus & Church, Stationery	90
Amount carried forward			\$253 06

		Amount brought forward	\$253 06
Mar.	23.	L. V. R. R. Co., Freight and Cartage	85
"	29.	A. B. Little, Typewriter Ribbon	1 50
"	31.	W. A. Slingerland, Labor	14 25
pr.	10.	U. S. Express Co., Expressage	1 25
"	28.	L. V. R. R. Co., Freight and Cartage	50
May	1.	W. A. Slingerland, Labor	15 70
"	1.	W. F. Falconer Mfg. Co., Supplies	15 00
"	1.	Andrus & Church, Supplies	7 60
"	15.	Mary Rogers, Labor	63 00
"	18.	U. S. Express Co., Expressage	80
"	22.	Andrus & Church, Stationery	75
June	1.	W. A. Slingerland, Labor	14 55
"	2.	Library Bureau, Supplies	2 50
"	3.	Andrus & Church, Stationery	2 40
"	3.	Treman, King & Co., Torch	45
"	7.	Library Bureau, Supplies	2 80
"	7.	Hawkins & Todd, Pins	2 50
"	7.	White & Burdick, Chemicals	3 26
"	7.	Bausch & Lomb, Supplies	9 49
"	9.	Andrus & Church, Stationery	3 00
"	12.	Lucy Torrance, Labor	2 20
"	25.	C. U. Dept. of Repairs, Repairs	23 70
"	24.	Whitehall, Tatum & Co., Chemicals	9 45
Total for Entomological Division			<u>\$450 56</u>

FOR DAIRY BACTERIOLOGICAL DIVISION.

1897.			
June	2.	William Boekel & Co., Incubator	95 00
"	5.	L. V. R. R. Co., Freight and Cartage	1 73
"	30.	Edward Pennock, Microscope and Fixtures	298 88
Total for Bacteriological Division			<u>\$395 61</u>

FOR VETERINARY SCIENCE DIVISION.

1897.			
May	6.	C. E. Bruce, Cow for Experimental Purposes	30 00
"	12.	J. C. Hart, Cow for Experimental Purposes	55 00
			<u>\$85 00</u>

SUMMARY.

*The Agricultural Experiment Station of Cornell University, in
account with the United States appropriation.*

1897.	Dr.	
To Receipts from Treasurer of the United States as per appropriation for the year ending June 30, 1897, under Act of Congress approved March 2, 1887 . . .		
		\$13,500 00
	Cr.	
June 30.	By Salaries	\$8,043 75
	Printing	351 75
	Office Expenses	1,029 09

EQUIPMENT, LABOR AND CURRENT EXPENSES.

Agriculture	694 02
Horticulture	1,343 15
Chemistry	442 96
Botany	664 11
Entomology	450 56
Dairy Bacteriology	395 61
Veterinary Science	85 00
	<hr/> \$13,500 00

RECEIPTS FOR PRODUCE SOLD.

Balance from 1895-6	850 29
Agricultural Division	34 00
Horticultural Division	89 54
Office	35 75
	<hr/> \$ 1,009 58
Printing.	427 34
Office	16
Balance to 1897-8	582 08
	<hr/> \$ 1,009 58

GENERAL INDEX.

	Page
Agricultural extension work (Bulletin 137)	321-333
appropriation for 1894	325
appropriation for 1895	326
appropriation for 1896	328
appropriation for 1897	328
experiments with fertilizers and in sugar beet culture	332
lines of work outlined	326
origin of the movement	325
teacher's leaflets published	331
ways of teaching the people	333
work for the children	330
work of 1897 outlined	328
Agriculturist, Report of	xxv
Army-worm in New York (Bulletin 133)	231-258
breeding places of	239
damage, extent of	242
destructiveness of second brood	248
description of, and their parents	234
distribution of and general history	336
eggs of	243
feeding habits of	240
food of	241
growth of the worms	244
habits of the moth	246
how to fight them	256
indications of their presence	241
infested fields, use of	252
life story of	243
natural enemies of	252
outbreaks of 1876	238
probable re-occurrence of	250
summary of life history	249
three broods of	240-247
transformation of	245
what they are	233
winter state of	249
Atkinson, Geo. L., Report	xix
Belvosia unifasciata Desv	254
Botanist, Report of	xix
Bordeaux mixture	156
Caldwell, Dr. G. C., Report	xvii
Celery, notes upon (Bulletin 132)	197-230
analysis of celery muck	228
analysis, partial, of celery	230
bibliography of the celery blight	219
early blight, artificial cultures of the fungus	205
early blight of	201
fertilizers, experiments with, on celery	221

	Page
Celery, notes upon— <i>Continued</i> .	
late blight of	209
late blight of, in the storage house	209
late blight, special character and artificial cultures of the fungus	214
remedies for early blight	203
remedies for late blight	213
storage house, construction of	215
storage houses for celery	215
sulfur for celery blight	204
two destructive diseases of	201
<i>Cercospora Apii</i>	202-205
Chemist, Report of	xvii
Chrysanthemum (Bulletin 136)	297-320
at home	304
Cornell notes of 1896 on	304
cultural notes of the 1896, test of	306
edible chrysanthemums	313
failures in	319
general remarks on	300
good varieties of, named	315
green varieties of, in 1896	318
less promising varieties of	318
not true to name	320
pink varieties of, in 1896	311
promising varieties of	317
red and yellow varieties of, in 1896	312
special purpose collections of	317
station exhibits of	301
summary of	320
unpopular varieties of	318
yellow varieties of, in 1896	311
white varieties of, introduced in 1896	308
Clinton, L. A., Report	xxv
<i>Clisiocampa americana</i>	xxii
<i>Clisiocampa disstria</i>	xxii
<i>Coleophora malivorella</i> Riley	5
Comstock, John Henry, Report	xxi
<i>Couotrachelus crataegi</i>	xxii
Co-operative Tillage Experiments (Circular 5)	335
Co-operative Tillage Experiments (Circular 6)	349
Copper carbonate solution	204
Curran canes, a disease of (Bulletin 125)	19-38
botanical character of the disease	25
cultivation of the tubercularia	28
effects of the disease	24
general character of the disease	23
history of the fungus	26
inoculation	37
<i>nectria connabaria</i>	32
occurrence of, as a parasite	27
<i>pleonectria berolinensis</i>	34
remedies for	38
Curran-stem girdler (Bulletin 126)	39-53
appearance of	45
bibliography of	53
distribution and destructiveness of	43
egg laying	47

Curraunt-stem girdler— <i>Continued.</i>	Page
enemies of	52
girdling of the shoot, how and why	48
habits of borers	50
historical	42
how to control	52
indications of its presence	43
mortality among eggs and grubs of	50
name and synonymy	41
preparations for winter	51
spring transformation of	46
tunnel, extent of	51
winter home of	46
Dahlia (Bulletin 128)	97-136
books on, societies and dealers	127
cactus dahlia, origin of	125
cactus dahlias	113
color of, a few words on	115
commercial possibilities of	124
Cornell variety test of 1896	129
cultivation of	122
cut flowers, dahlias as	115
exhibition of at Am. Inst. Fair, New York City	100
frost, a word about	124
history of	104
improvements of, suggested	108
introduction	99
merits of	109
place for dahlias	113
pompons	119
single dahlias	111
single stem branching system	123
suggestions relating to	119
variegated dahlias	117
varieties recommended	131
Director, Report of	ix
Diseases of currants, see currant canes.	
Entomologist, Report of	xxi
Extension work, see agricultural extension.	
Fertilizers, experiments with	349
Fertilizers, see field experiments with.	
Field experiments with fertilizers (Bulletin 129)	136-147
cultivation of the plats	145
fertilizers to be applied	144
harvesting the crop	146
introduction	139
plats, size, shape and arrangement of	143
plan of experimental plats	140
quantity to be applied	145
results	146
selection of the field for	143
soil fertility, general remarks on	141
Financial Report (Appendix II).	
Forage crops (Bulletin 135)	269-296
average results 1895 and 1896	288
barley and peas as forage crop	290
clovers compared as nitrogen gatherers	296

Forage crops— <i>Continued.</i>	Page
corn as a forage crop	272
corn planting, thick and thin seeding	274
crimson clover as	294
crimson clover as late fall pasture	296
experiments in thick and thin seeding of corn, 1895-96	274
feeding millet green	293
food constituents of fodders	276
Hungarian and millets as forage crops	290
list of plants used	272
maturity of corn as affecting its food value	278
method of seeding	284
millet hay	294
necessity for	271
oats and peas as a forage crop	283
preparation of the soil	284
results in cutting corn at other stations	282
rye as a forage crop	290
sacaline as a	294
soil for corn and its preparation	273
sorghum as	294
summary	296
teosinte as a	294
time for cutting corn	279
Horticulturist, Report of	xxvii
Hunn, C. E., Report	xxvii
Insects, injurious.	
See Army-Worm.	
Currant-Stem Girdler.	
Pistol-Case-Bearer.	
Raspberry-Cane Maggot.	
Janus integer Norton	41
Leucania unipuncta Haworth	233
Nectria cinnabarina	32
Nixon Bill.	
See Agricultural Extension.	
Phorbia sp	54
Pistol-Case-Bearer (Bulletin 124)	1-18
adult insect	8
appearance of, in New York	5
appearance of	6
briefly summarized	15
distribution of	6
egg laying	14
emergence of the moth	13
feeding habits of	12
food plants of	6
habits of recently hatched caterpillars	14
history of	5
how to combat	16
moulting of the caterpillar	11
name of	9
natural enemies of	16
origin of names	5
pistol-shaped suit of	10
preparation for winter	15
pupation of	13

Pistol-Case Bearer— <i>Continued.</i>	Page
spring appearance of	10
winter stage of	10
work on apple foliage	7
Pleonectria herolinensis	34
Plums, notes on, for Western New York (Bulletin 131)	165-195
black knot	175
blight of	176
curculio	177
curculio catcher	178
fruit rot of	176
general remarks	169
insect enemies and diseases of	175
introduction	167
planting	174
plum orchard, the	172
plum scale	177
pruning	174
soils suitable for	173
stocks	173
tillage of	175
types of plums	169
varieties of	179
varieties of (S. D. Willard's list)	180
Potato culture (Bulletin 130)	149-163
average yields compared	156
conclusions	162
experiment of 1896	154
land selected, study of	151-157
preparation of land	151
record of cultures 1895	153
record of plantings 1895	153
record of plats 1896, table	155
results, discussion of	158
results in 1895, table of	154
Potato tillage experiments	335
Raspberry-Cane Maggot (Bulletin 126)	54-60
appearance of	55
appearance of, in New York	54
bibliography	60
distribution of	57
enemies of	59
food plants of	57
history of	57
how to combat	59
life history of	57
name of	56
presence of, indicated	55
pupation	59
work of the maggot	58
Roberts, I. P., Report	ix
Schnurman, J. G., Letter of Transmittal	vii
Septoria petroselinii var. Apii	207-214
Slingerland, M. V., Report	xxi
Strawberries under glass (Bulletin 134)	259-268
fruit, demand for	267
fruit produced	266

	Page
Strawberries under glass— <i>Continued.</i>	
holding up the berries	265
plants used and how treated	263
points of special importance	267
pollinating	264
Sugar Beets, Tillage Experiment	343
Sweet peas—a second account of (Bulletin 127)	61-95
forms classified	70
introductory	63
Kains, M. G., numerical notes by	91
points in judging	69
Rohnert, W. C., remarks by	66
varieties described	75
varieties rated	72
Treasurer, Report of	xxix
True, Dr. A. C., letter from	xv
Tubercularis vulgaris Tode	25
Willard, S. D., list of plums for Western New York	180
Winthemia 4-pustulata Fabr	253

INDEX OF CUTS.

	Page
Army worm.	
corn plant, at work on	opposite 232
frontispiece	231
light and dark varieties of army worms	235
moth and eggs	opposite 233
pupæ of army worm.	246
Celery.	
Cercospora Apii, growth in agar	207
hyphæ of, when grown on bean stems	206
early blight, microscopic character of	202
fertilizers on, effects shown	222, 223, 226, 227, 228
frontispiece	197
houses at South Lima	215
same, interior view	217
same, south view	216
improved houses at Irondequoit	218
late blight, spots on a leaf	208
plant affected with	210
pycnidium, section of	209
model house, details of	219
construction	220
storage house, old style, interior	opposite 201
Chrysanthemum.	
frontispiece	297
Good Gracious	306
Lenawee	314
Miss Magee, good stock	310
Miss Magee, poor stock	309
Oriental Glory	304
Rosy Emperatrice	312
showing early and late potting	308
Currant.	
diseased canes	23
diseased plants	opposite 23
frontispiece (Fay currants)	19
germinating conidia	28
hyphæ of bearing conidia	26
longitudinal section of a tubercle	25
tubercularia vulgaris, germinating secondary conidia of	31
Nectria, cinnabarina, germinating spores of	33
longitudinal section of a stroma and single peritheci-	32
mycelium of, producing secondary conidia	34
Pleonectria berolinensis, germinating spores of	36
longitudinal section of a cluster of perithecia	35
longitudinal section of a single peritheci-	35
mycelium of, producing secondary conidia	37
Stem-girdler (Bulletin No. 126).	
cocoon	47
frontispiece	39
male and female of	42
ovipositor of female	opposite 43
pupa	47
shoots split to show tunnels	51
stems cut open to show the tunnels made by the larvæ	47
winter appearance of girdled stems	44
work of	opposite 43

	Page
Dahlia.	
frontispiece	97
Grand Duke Alexis	106
Matchless	126
Miss May Lomas	104
Mrs. A. Peart	opposite 103
portrait (Rev. C. W. Bolton)	114
single dahlia, a	111
Rev. C. W. Bolton	120
Varidiflora, the green dahlia	112
Wm. Agnew	118
Field experiments, frontispiece	137
Forage crops	
barley and oats, relative growth of	291
crimson clover	295
frontispiece	269
oat field at Cornell University	289
oats and peas grown for late forage	292
sowed corn	279
view of plats of forage crops	286
Map. Fertilizer Experiments in New York	between iv and v
Map. Sugar Beet Cultural Experiments in New York	between iv and v
Plum.	
a condition not a theory	172
curculio catcher, Geneva type	178
Diamond	181
Empire	184
French Damson	181
frontispiece	165
fruit-rot of	176
German Prune	186
Grand Duke	181
Hudson River Purple Egg	181
Italian Prune or Fellenburg	188
Monarch	181
Peter's Yellow Egg	190
Quackenboss	181
Reine Claude, eight years set	opposite 169
Shipper's Pride	185
Shropshire Damson	192
Weedsport Prune	193
Pistol-Case-Bearer, plates	opposite 8, 9
frontispiece	1
work on apple	7
Potato culture, frontispiece	149
cultivator suitable for	160
tillage to conserve moisture	159
view of gravelly soil on which the potatoes were grown	opposite 153
Raspberry-Cane Maggot.	
infested shoots	54, 59
plate showing insect and its work	opposite 58
Strawberries under glass.	
bench of Beder Wood in 6-in. pots	262
frontispiece	259
Sweet Peas, frontispiece	61
sweet peas in winter	74
the Cornell sweet pea patch	opposite 69

APPENDIX III.

Teacher's Leaflets on Nature-Study.

- No. 1. How a Squash Plant gets out of the Seed.
- No. 2. How a Candle Burns.
- No. 3. Four Apple Twigs.
- No. 4. A Children's Garden.
- No. 5. Some Tent Makers.
- No. 6. What is Nature-Study ?
- No. 7. Hints on Making Collections of Insects.



TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

THE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY,

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

THIRD EDITION.

No. 1.

DEC. 1, 1896.

How a Squash Plant Gets Out of the Seed.

BY L. H. BAILEY.



1. *Squash*
plant a week
old.

If one were to plant seeds of a Hubbard or Boston Marrow squash in loose, warm earth in a pan or box, and were then to leave the parcel for a week or ten days, he would find, upon his return, a colony of plants like that shown in Fig. 1. If he had not planted the seeds himself or had not seen such plants before, he would not believe that these curious plants would ever grow into squash vines, so different are they from the vines which we know in the garden. This, itself, is a most curious fact,—this wonderful difference between the first and the later stages of all plants, and it is only because we know it so well that we do not wonder at it.

NOTE.—These leaflets are intended for the teacher, not for the scholars. It is their purpose to suggest the method which a teacher may pursue in instructing children at odd times in nature-study. The teacher should show the children the objects themselves,—should plant the seeds, raise the plants, collect the insects, etc. ; or, better, he should interest the children to collect the objects. Advanced pupils, however, may be given the leaflets and asked to perform the experiments or make the observations which are suggested. The scholars themselves should be taught to do the work and to arrive at independent conclusions. Teachers who desire to inform themselves more fully upon the motives of this nature-study teaching, should write for a copy of Bulletin 122, of the Cornell Experiment Station, Ithaca, N. Y.

It may happen, however,—as it did in a pan of seed which I sowed a few days ago—that one or two of the plants may look like that shown in Fig. 2. Here the seed seems to have come up on top of the plant, and one is reminded of the curious way in which beans come up on the stalk of the young plant. If we were to study the matter, however,—as we may do at a future time—we should find a great difference in the ways in which the squashes and the beans raise their seeds out of the ground. It is not our purpose to compare the squash and the bean at this time, but we are curious to know why one of these squash plants brings its seed up out of the ground whilst all the others do not. In order to find out why it is, we must ask the plant, and this asking is what we call an experiment.

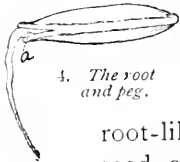


2. *Squash plant which has brought the seed-coats out of the ground.*

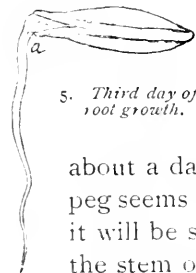


3. *Germination just beginning.*

We may first pull up the two plants. The first one (Fig. 1) will be seen to have the seed-coats still attached to the very lowest part of the stalk below the soil, but the other plant has no seed at that point. We will now plant more seeds, a dozen or more of them, so that we shall have enough to examine two or three times a day for several days. A day or two after the seeds are planted, we shall find a little point or root-like portion breaking out of the sharp end of the seed, as shown in Fig. 3. A day later this root portion has grown to be as long as the seed itself (Fig. 4), and it has

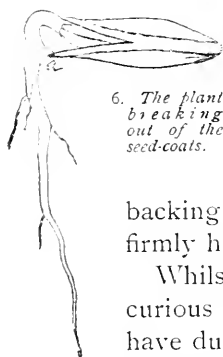


4. *The root and peg.*



5. *Third day of root growth.*

turned directly downwards into the soil. But there is another most curious thing about this germinating seed. Just where the root is breaking out of the seed (shown at *a* in Fig. 4), there is a little peg or projection. In Fig. 5, about a day later, the root has grown still longer, and this peg seems to be forcing the seed apart. In Fig. 6, however, it will be seen that the seed is really being forced apart by the stem or the stalk above the peg, for this stem is now growing longer. The lower lobe of the seed has attached



6. *The plant breaking out of the seed-coats.*

to the peg (seen at *a*, Fig. 6), and the seed-leaves are trying to back out of the seed. Fig. 7 shows the seed still a day later. The root has now produced many branches and has thoroughly established itself in the soil. The top is also growing rapidly and is still backing out of the seed, and the seed-coats are still firmly held by the obstinate peg.

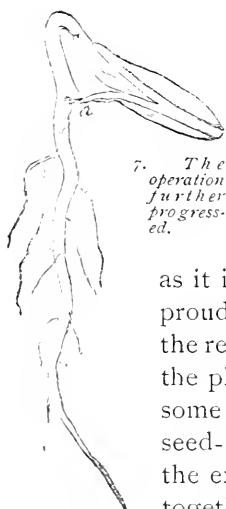
Whilst we have been seeing all these curious things in the seeds which we have dug up, the plantlets which we have not disturbed have been coming through the soil.



8. *The plant just coming up.*

If we were to see the plant in Fig. 7, as it was "coming up," it would look like Fig. 8. It is tugging away trying to get its head out of the bonnet which is pegged down underneath the soil, and it has "got its back up" in the operation. In Fig. 9, it has escaped from its trap and it is laughing and growing in delight. It must now straighten itself up,

as it is doing in Fig. 10, and it is soon standing proud and straight, as in Fig. 1. We now see that the reason why the seed came up on the plant in Fig. 2, is because in some way the peg did not hold the seed-coats down (see Fig. 13), and the expanding leaves are pinched together, and they must get themselves loose as best they can.



7. *The operation further progressed.*



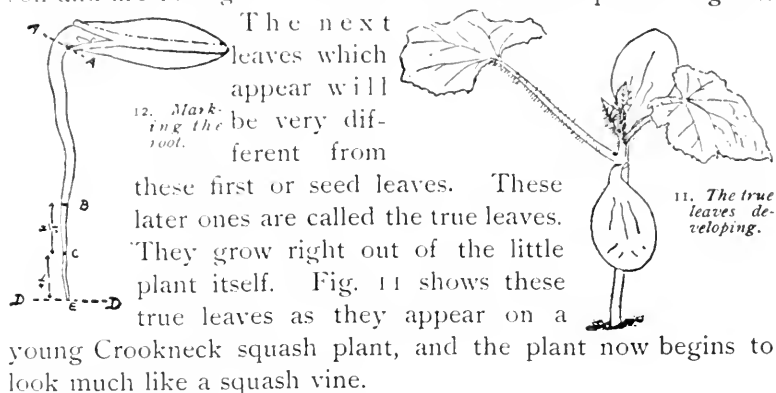
9. *The plant liberated from the seed-coats.*

There is another thing about this curious squash plant which we must not fail to notice, and this is the fact that these first two leaves of the plantlet came out of the seed and did not grow out of the plant itself. We must notice, too, that these leaves are much smaller when they are first drawn out of the seed than they are when the plantlet has straightened itself up. That is, these leaves increase very much in size after they reach the light



10. *The plant straightening up.*

and air. The roots of the plantlet are now established in the soil and are taking in food which enables the plant to grow.



The next leaves which appear will be very different from these first or seed leaves. These later ones are called the true leaves. They grow right out of the little plant itself. Fig. 11 shows these true leaves as they appear on a young Crookneck squash plant, and the plant now begins to look much like a squash vine.

We are now curious to know how the stem grows when it



13. The root grows in the end portions.

14. The marking of the stem, and the spreading apart of the marks.

backs out of the seeds and pulls the little seed leaves with it, and how the root grows downwards into the soil. Now let us pull up another seed when it has sent a single root about two

inches deep into the earth. We will wash it very carefully and lay it upon a piece of paper. Then we will lay a ruler alongside of it, and make an ink mark one-quarter of an inch from the tip, and two or three other marks at equal distances above (Fig. 12).* We will now carefully replant the seed. Two days later we will dig it up, when we shall most likely find a condition something like that in Fig. 13. It will be seen that the marks E, C, B, are practically the same distance apart as before and they are also the same distance from the peg AA. The point of the root is no longer at DD, however, but has grown on to F. The root, therefore, has grown almost wholly in the end portion.

Now let us make a similar experiment with the stem or stalk. We will mark a young stem, as at A in Fig. 14; but the next day we shall find that these marks are farther apart than when we made them (B, Fig. 14). The marks have all raised themselves above the ground as the plant has grown. The stem, therefore, has grown between the joints rather than from the tip. The stem usually grows most rapidly, at any given time, at the upper or younger portion of the joint (or internode); and the joint soon reaches the limit of its growth and becomes stationary, and a new one grows out above it.

Natural science consists in two things,—seeing what you look at, and drawing proper conclusions from what you see.

* NOTE.—Common ink will not answer for this purpose because it “runs” when the root is wet, but indelible ink, used for marking linen or for drawing, should be used. It should also be said that the root of the common pumpkin, and of the summer bush squashes, is too fibrous and branchy for this test. It should be stated, also, that the root does not grow at its very tip, but chiefly in a narrow zone just back of the tip; but the determination of this point is rather too difficult for the beginner, and, moreover, it is foreign to the purpose of this tract.

TO THE TEACHER :

This is the first of a proposed series of leaflets designed to suggest methods of presenting nature-study upon common-place subjects. This is a new field of effort for the College of Agriculture, and we therefore look upon the methods as largely experimental. We are endeavoring to determine the best way of interesting children in country life. You can give us many suggestions, and we should like a free expression of your opinions and experiences. It should be borne in mind that the object of these lessons is not to impart direct and specific information, but to train the child in the powers of seeing and inquiring. The teacher should keep the attention of the pupil closely fixed upon the germinating seed (when the subject of this leaflet is under review), asking him to describe everything which he sees. Require that the pupil sees all that is specified in this leaflet, and endeavor to lead him on to see things which are not here described. Once the inquiry is started, you will no doubt be able to conduct other similar experiments from time to time. If questions come up which you cannot answer, write them to us and we may be able to help you.

We suggest that you ask your pupils to write short compositions upon these lessons and to make sketches of the observations, and that you send us some of these from time to time, in order that we may learn how the experiment is working. We do not care for the best essays alone, but simply the average. The suggestions which we obtain from teachers will aid us greatly in the preparation of future leaflets.

TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

THE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY,

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

THIRD EDITION.

No. 2.

MAY 21, 1897.

How a Candle Burns.

BY GEORGE W. CAVANAUGH.

I. OXYGEN.

Light the candle and place it upon a piece of blotting paper.

Ques. What do you see burning?

Ans. The candle; or the wick and wax (or tallow).

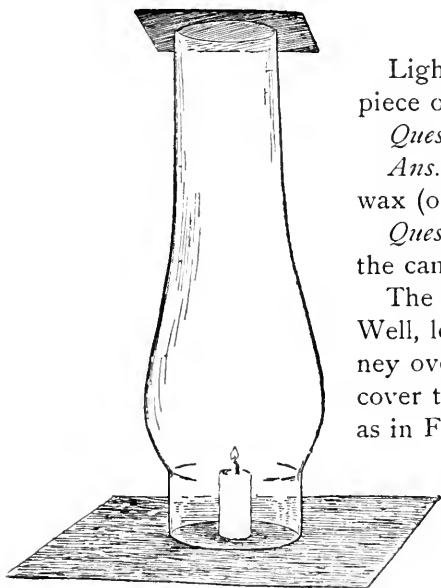
Ques. Is anything burning besides the candle?

The answer will probably be "No." Well, let us see. Place the lamp chimney over the lighted candle, and partly cover the top by a piece of stiff paper, as in Fig. 15. Ask the pupils to observe and describe how the flame goes out; i. e., that it is gradually extinguished and does not go out instantly.

Ques. Why did the flame go out?

The probable answer will be, "Because there was no air." (If there was no air within the chimney, some could have entered

NOTE TO THE TEACHER.—The materials needed for this exercise are a piece of candle about two inches long, a lamp chimney (one with a plain top is best), a



15. The beginning of the experiment.

at the top.) Place a couple of pencils beside the relighted candle and on them the chimney, as in Fig. 16.

Ques. What is the difference between the way in which the candle burns now and before the chimney was placed over it?

Ans. It flickers, or dances about more.

Ques. What makes boys and girls feel like dancing about when they go out from a warm school room?

Ans. The fresh air.

Ques. What makes the flame dance or flicker when the chimney is raised by the pencils?

Ans. Because it gets fresh air under the chimney.

Repeat the first experiment, in which the flame grows gradually smaller till it is extinguished.

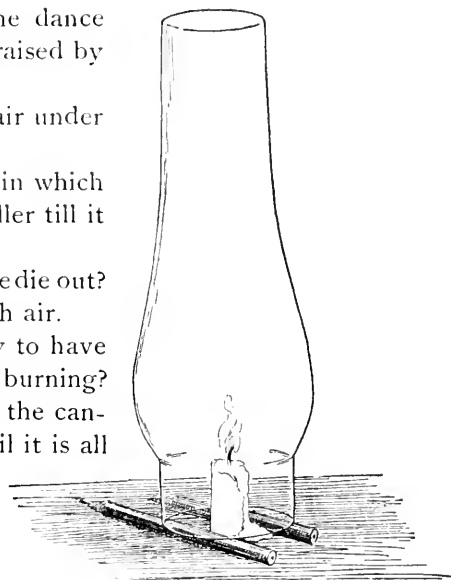
Ques. Why now does the flame die out?

Ans. Because it had no fresh air.

Ques. Is it really necessary to have fresh air in order to keep a flame burning?

Ans. Yes; since otherwise the candle would continue to burn until it is all used up.

To prove this further, let the candle be relighted. Place the chimney over it, now having the top completely closed by a piece of paper. Have ready a lighted splinter or match, and



16. Supplying air underneath the chimney.

piece of white crockery or window glass, a piece of fine wire about six inches long, a bit of quicklime about half the size of an egg, and some matches. All of these, with the possible exception of the quicklime, can be obtained in any household. If you perform the experiment requiring the lime, be sure that you start with a fresh piece of quick or stone lime, which can be had of any lime or cement dealer. During the performance of the following simple experiments, ask your pupils to describe to you what they see you do at each step. The questions inserted in the text are offered merely as suggestions in the developing of the desired ideas. The answers, which are intended only for the teacher, are those which it is desired shall be given by the pupils.

just as soon as the candle is extinguished remove the paper from the chimney-top and thrust in the lighted splinter.

Ques. Why does the light on the splinter go out ?

Ans. Because there is no fresh air inside the chimney.

Ques. What became of the freshness that was in the air ?

Ans. It was destroyed by the burning candle.

Evidently there is some decided difference between fresh air and air from which the freshness has been burned, since a flame can continue to burn only in air that has the quality known as freshness. This quality in fresh air is due to a gas which has the name of oxygen, and which is represented by the letter O.

Ques. Why was the splinter put out instantly while the candle flame died out gradually ?

Ans. When the splinter was thrust in, the air had no freshness or oxygen at all, while when the candle was placed under the chimney it had whatever oxygen was originally in the air within the chimney.

Endeavor to have this point clearly understood: that the candle did not go out as long as the air had any oxygen and that the splinter was extinguished immediately because there was no oxygen left. Relight the candle. Our second question may now be repeated :

Ques. Is anything else burning besides the candle ?

Ans. Yes ; the oxygen of the air.

When the subject of the necessity of fresh air and consequently of oxygen for the burning of the candle seems to be understood, the following questions, together with any others which suggest themselves, may be asked.

What is the reason that draughts are opened in stoves ?

Why is the bottom of a " burner " on a lamp always full of holes ?

II. CARBON.

Let us now observe the blackened end of a burned match or splinter. This black substance is usually known by the name of charcoal and if handled will blacken the fingers. Try this. The same substance is found on the bottoms of kettles which have been used over a wood fire, only it is a fine powder.

Let us see what was burning when the candle was lighted, besides the oxygen in the air. Relight the candle and hold the porcelain or glass about an inch above the bright part of the flame.

Ques. What happens to it there ?

Next lower it directly into the flame. (Fig. 17.)

Ques. What is the black stuff that gets onto the glass ?

Look closely and see whether it is not deposited here also as a fine powder.

Ques. Will this deposit from the candle blacken the fingers ?

Instead of using the name charcoal for this black substance, let us call it carbon (represented by C), the better name, because there are several kinds of carbon, and charcoal is only that kind which is rather light and easily blackens the hands.

Some other kinds are the diamond, coal and the black substance in lead pencils. This last kind is called graphite. These are all much harder than charcoal.

The carbon from the candle flame came mostly from the wax or tallow ; only a very small portion came from the wick.

It cannot be seen in the tallow, neither can it be seen in unburned wood, and yet it can be found when the wood is partly burned. The condition in which the carbon exists in the tallow or wood may be explained in a later lesson. At present it suffices that it is there.

Why, now, is the glass blackened when held in the flame and not when held just directly above it ? It is because the carbon from the candle has not been completely burned at the middle of the flame ; but it is burned beyond the bright part of the flame. When the glass is held in the flame, the carbon that is not yet completely burned is deposited on it, because it is cooler than that in the surrounding flame.

A fine deposit of carbon can be had from any of the luminous parts of the flame ; and it is these thousands of little particles of carbon, getting white hot, which glow like coals in the stove and



17. *The carbon or soot on the glass.*

make the light. Just as soon as they are completely burned, there is no more light, the same as coals cease to glow when burned to ashes.

III. CARBON DIOXID.

Let us now enquire what becomes of the carbon that we find in the bright part of the flame and of the oxygen that was in the air in the lamp chimney. When the candle was extinguished within the chimney there was no oxygen left, as shown by the lighted splinter which was put out immediately. Neither could any of the particles of carbon be found except on the wick. Yet they both still exist within the chimney but in an entirely different condition than before. While the candle was burning the little particles of carbon that we find ascending in the flame are joining with the oxygen of the air and making an entirely new substance. This new substance is a gas like oxygen and can not be seen in the air.

Ques. Of what two substances is this new substance made?

Ans. Carbon and Oxygen.

What shall we call this substance? Since it is made of carbon and oxygen it ought, if possible, to have a name that will show its composition. Its name is carbon dioxid. The words carbon and oxid show of what it is made and the prefix *di*, which means two, shows that it contains twice as much oxygen as carbon. This is represented by the formula CO_2 .

Place the bit of quicklime in about half a glass of water on the day previous to the experiment. When ready for use there will be a white sediment at the bottom and a thin white scum on the top of the clear lime water. Call the attention of the pupils to this white scum as a question about it will follow. Make a loop in the end of the piece of wire by turning it around the point of a lead pencil. Remove the scum from the lime water with a piece of paper and insert the loop into the clear water. When withdrawn, the loop ought to hold a film of clear water. Pass the wire through a piece of cardboard or stiff paper, and arrange as shown in Fig. 18.

Place the chimney over the lighted candle. Lower the loop into the chimney and cover the top of the chimney with the

paper. Withdraw the wire a couple of minutes after the candle goes out. Note the cloudy appearance of the film of water on the wire. The cloudiness was caused by the carbon dioxide formed while the candle was burning.

Omitting the candle, hang the freshly wetted wire in the empty chimney. Let the film of lime water remain within the chimney for the same length of time as when the candle was used. It does not become cloudy now. The cloudiness in clear lime water is a test or indication that carbon dioxide is present.

Ques. What caused the white scum on the lime water which stood over night?

Ans. Some CO_2 in the air.

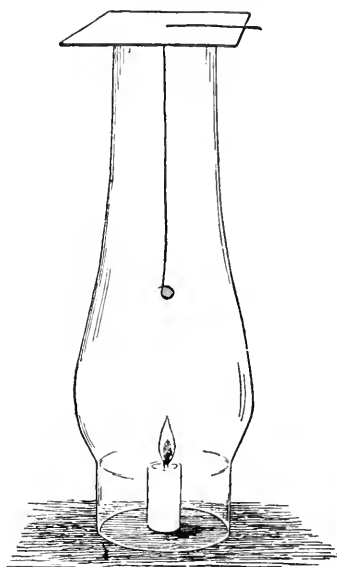
Ques. How does the CO_2 get into the air?

Ans. It is formed whenever wood, coal, oil or gas is burned.

The amount of CO_2 in ordinary air is very small, being only three parts in ten thousand. If the lime water in the loop be left long enough in the air it will become cloudy. The reason it clouds so quickly when the candle is being burned is that a large amount of CO_2 is formed. Besides being made by real flames, CO_2 is formed every time we breathe out air. Renew the film of water in the loop and breathe against it gently for two or three minutes.

The presence of CO_2 in the breath may be shown better by pouring off some of the clear lime water into a clean glass and blowing into it through a straw.

An interesting question to end the lesson with is: Why does water put out a fire? The answer is, not alone because it wets, but because it cools the carbon, which must be hot in order to unite with the oxygen, and prevents the oxygen of the air from getting as near the carbon as before.



18. The test with the film of lime water.

TO THE TEACHER:

This is the second of a proposed series of leaflets designed to suggest methods of presenting nature study upon common-place subjects. This is a new field of effort for the College of Agriculture, and we therefore look upon the methods as largely experimental. We are endeavoring to determine the best way of interesting children in country life. You can give us many suggestions, and we should like a free expression of your opinions and experiences. It should be borne in mind that the object of these lessons is not to impart direct and specific information, but to train the child in the powers of seeing and inquiring. The teacher should keep the attention of the pupil closely fixed upon the experiments, asking him to describe everything which he sees. Require that the pupil sees all that is specified in this leaflet, and endeavor to lead him on to see things which are not here described. Once the inquiry is started, you will no doubt be able to conduct other similar experiments from time to time. If questions come up which you cannot answer, write them to us and we may be able to help you.

We suggest that you ask your pupils to write short compositions upon these lessons and to make sketches of the observations, and that you send us some of these from time to time in order that we may learn how the experiment is working. We do not care for the best essays alone, but simply the average. The suggestions which we obtain from teachers will aid us greatly in the preparation of future leaflets. We should particularly appreciate suggestions as to the most useful subjects to be taken up in these tracts.

Teacher's Leaflets on
Nature-Study.

NO. 3.

TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

FOURTH ISSUE.

No. 3.

JUNE 1, 1897.

THE COLLEGE OF AGRICULTURE, CORNELL UNIVERSITY,

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

I. P. ROBERTS, DIRECTOR.

Four Apple Twigs.

BY L. H. BAILEY.

The other day, as I walked through an apple orchard for the first time since the long winter had set in, I was struck by the many different shapes and sizes of the limbs as I saw them against the blue-gray of the February sky. I cut four of them in passing, and as I walked back to the house I wondered why the twigs were all so different; and I found myself guessing whether there would be any apples next summer.

Now, I have had pictures made of these four little apple limbs. Let us look them over and see if they have any story to tell of how they grew and what they have set out to do.

I.

One of these twigs (Fig. 19) was taken from a strong young tree which, I remember, bore its first good crop of apples last year. This simple twig is plainly of two years' growth, for the "ring" between the old and new wood is seen at B. That is, the main stem from the base up to B grew in 1895, and the part from B to the tip grew in 1896. But the buds upon these two parts look very unlike. Let us see what these differences mean.

We must now picture to ourselves how this shoot from B to 10 looked last summer whilst it was growing. The shoot bore leaves. Where? There was one just below each bud; or, to be more exact, one bud developed just above each leaf. These

buds did not put out present size and then

What are these do in 1897? We can just one year and (or older) part of the (below B) the buds Therefore, they must no leaves borne below

FIG. 19—A two-year-old shoot from a young apple tree. Half size.

each of these branches the growth in the to be simple buds at branches.

But the strangest has not yet been seen, sizes, and three of stripped the others ent kind. It should lowermost bud (at 1) perfectly dormant will be seen, then, smallest branches are and the three strong the last year's growth.

If, now, we picture of 1895, we will see

leaves. They simply grew to their stopped.

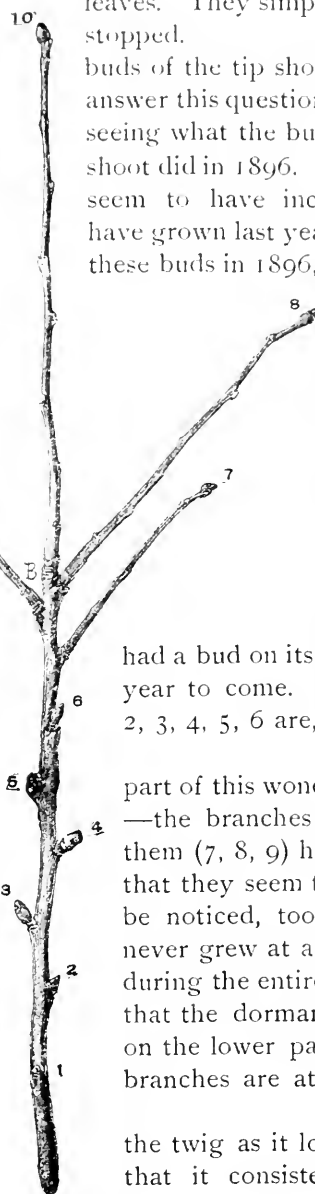
buds of the tip shoot proposing to answer this question by going back seeing what the buds on the lower shoot did in 1896. Upon that part seem to have increased in size. have grown last year. There were these buds in 1896, but a cluster of

leaves came out of each little bud in the spring. As these leaves expanded and grew, the little bud grew on; that is, each bud grew into a tiny branch, and when fall came

had a bud on its end to continue year to come. What we took 2, 3, 4, 5, 6 are, therefore, little

part of this wonderful little twig—the branches are of different them (7, 8, 9) have so far out—that they seem to be of a differ-be noticed, too, that the very never grew at all, but remained during the entire year 1896. It that the dormant bud and the on the lower part of the shoot, branches are at the very tip of

the twig as it looked in the fall that it consisted of a single



shoot, terminating at B. It had a large terminal bud (like those at 7, 8, 9, 10), and this bud pushed on into a branch in 1896, and three other buds near the tip did the same thing.

Why did some of these branches grow to be larger than others? "Simply because they were upon the strongest part of the shoot, or that part where the greatest growth naturally takes place," some one will answer. But this really does not answer the question, for we want to know why this portion of the shoot is strongest. The real reason is because there is more sunlight and more room on this outward or upward end. In 1897,—if this shoot had been spared—each of these four largest twigs (7, 8, 9, 10) would have done the same thing as the parent twig did in 1896: each would have pushed on from its end, and one or two or three other strong branches would probably have started from the wrong side buds near the tips, the very lowest buds would, no doubt, have remained perfectly inactive or dormant for lack of opportunity, and the intermediate buds would have made short branches like 2, 3, 4, 5, 6. In other words, the tree always tries to grow onward from its tips, and these tip shoots eventually become strong branches, unless some of them die in the struggle for existence. What, now, becomes of the little branches lower down?

II.

From another apple tree I took the twig shown in Fig. 20. We see at once that it is very unlike the other one. It seems to be two years old, one year's growth extending from the base up to 7, and the last year's growth extending from 7 to 8; but we shall see upon looking closer that this is not so. The short branchlets at 3, 4, 5, 7 are very different from those in Fig. 19. They seem to be broken off. The fact is that



Fig. 20.—A three-year-old shoot and the fruit-spurs. Half size.

the broken ends shown where the apples were borne in 1896. The branchlets that bore them, therefore, must have grown in 1895, and the main branch, from 1 to 7, grew in 1894. It is plain, from the looks of the buds, that the shoot from 7 to 8, grew last year, 1896.

Starting from the base, then, we have the main twig growing in 1894; the small side branches growing in 1895; these little branches bearing apples in 1896, and the terminal shoot also growing in 1896. Why was there no terminal shoot growing in 1895? Simply because its tip developed a fruit-bud (at 7) and therefore could not send out a branch; for there are two kinds of buds,—the small pointed leaf-bud and the thick blunt fruit-bud. If the branchlets 3, 4, 5, 7, are two years old, the dormant buds—1, 2—must be the same age. That is, for two long years these little buds have been waiting for some bug to eat off the buds and leaves above, or some accident to break the shoot beyond them, so that they might have a chance to grow; but they have waited in vain.

We have now found, therefore, that the little side shoots upon apple twigs become fruit-branches or fruit-spurs, whilst the more ambitious branches above them are making a great display of stem and leaves.

But will these fruit-spurs bear fruit again in 1897? No. The bearing of an apple is hard work, and these spurs did not have enough vitality left to make fruit-buds for the next year; but they must perpetuate themselves, so they have sent out small side buds which will bear a cluster of leaves and grow into another little spur in 1897, and in that year these new spurs will make fruit-buds for bearing in 1898. The side bud is plainly seen on spur 5, also on spur 4, whilst spur 7 has sown a seed, so to speak, in the bud at 6. It is therefore plain why the tree bears every other year.

III.

There was one tree in the orchard from which the farmer had not picked his apples. Perhaps the apples were not worth picking. At any rate, the dried apples, shriveled and brown, are

still hanging on the twigs, and even the birds do not seem to care for them. I broke off one of these twigs (Fig. 21). Let us see how many apples this curious twig has borne. We can tell by the square-cut scars. An apple was once borne at 1, another at 2, another at 4, another at 5, another at 6, and another at 7,—and at 7 there will be a scar when the apple falls. Six apples this modest shoot has borne! And I wonder how many of them got ripe, or how many were taken by the worms, or how many were eaten by the little boys and girls on their way to school!

A curious thing happened when the fruit was growing at 2. Two side buds started out, instead of one, and both of them grew the next year. But one of the little branchlets fell sick and died, or a bug nipped off its end, or it starved to death; and the grave is still marked by the little stick standing up at 3. The other branchlet thrived, and eventually bore apples at 4, 5, 6 and 7.

I have said that these fruit-spurs bear only every other year; then, if this branch has borne six apples, it must be twelve

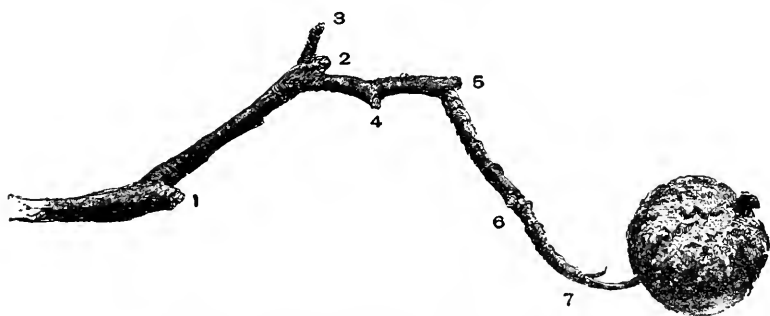


FIG. 21.—*A fruit-spur which has borne six apples. Half size.*

years old. The truth is that it is about twenty years old, for some years it failed to bear; but the age cannot be traced out in the picture, although any little boy or girl with bright eyes could soon learn to trace out yearly rings on the shoot itself.

IV.

The last shoot which I got that day has a whole volume of history in it, and I cannot begin to tell its story unless I should

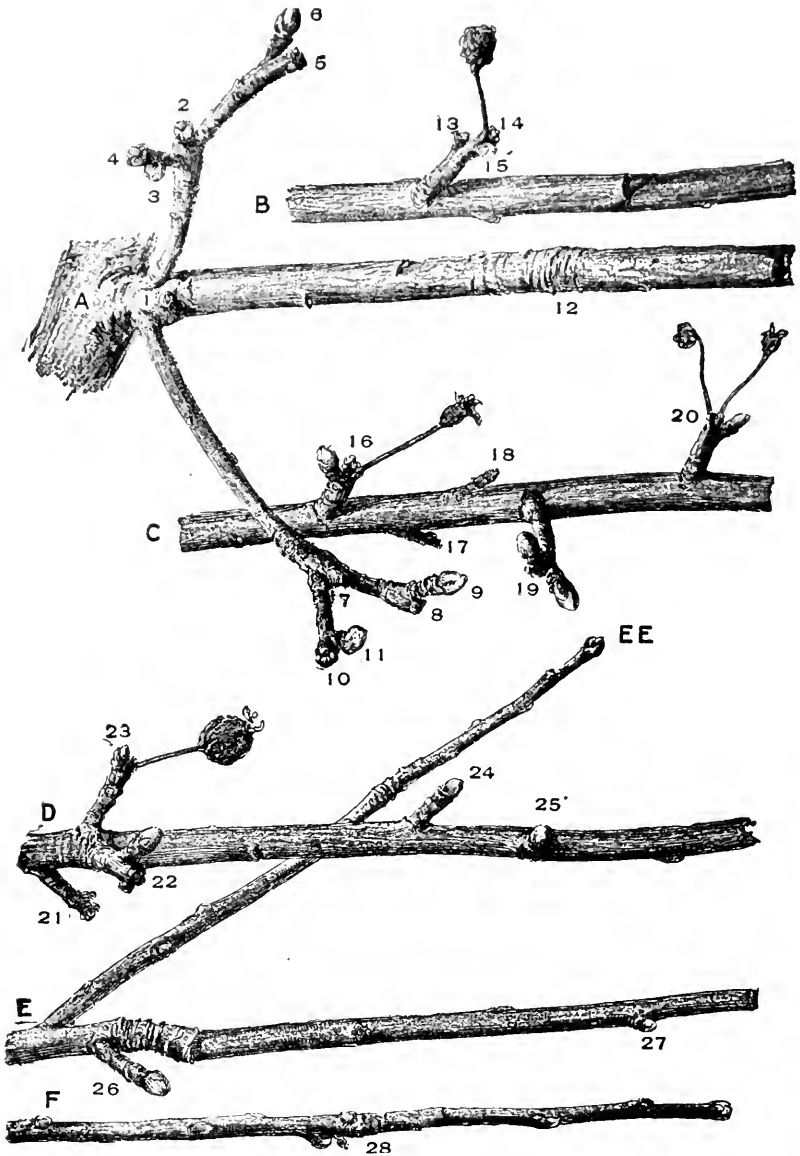


FIG. 22.—A seven-year old apple twig and its curious history. Half size.

write a small book. But we will trace out its birthdays and see how many apples it has borne. It is shown in Fig. 22, and because it is so long I have had to break it in two several times to get it on the page. It begins at A, and is continued at B, C, D, E, and F.

Let us count the yearly rings and see how old the whole limb is. These rings are at 28, 26, D, 12, 1,—five of them; and as the shoot grew one year before it made any ring, and another year made no increase in length—as we shall presently see—the whole branch must be seven years old. That is, the limb probably started in 1890.* Let us begin, then, at A, and follow it out.

1890. Started as a spur from the main branch, A, and grew to 1.

1891. Apple borne at 1. This apple did not mature, however, as we can readily see by the smallness of the scar. In this year, two side buds developed to continue the spur the next year.

1892. Gave up its desire to be a fruit-spur, and made a strong growth on to 12. For some reason, it had a good chance to grow. Perhaps the farmer pruned the tree, and thereby gave the shoot an opportunity; or perhaps he plowed and fertilized the land.

In the meantime one of the side buds grew to 3, and the other to 7, and each made a fruit-bud at its end.

1893. Shoot grew lustily,—on to D.

The fruit-bud at 3 bore an apple, which probably matured, as shown by the scar 2. Two side buds were formed beneath this apple to continue the spur next year.

The fruit-bud at 7 bloomed, but the apple fell early, as shown by the small scar. Two side buds were formed.

The buds upon the main shoot—1 to 12—all remained dormant.

* It is really impossible to tell whether the shoot started from the limb A in 1889 or 1890, without knowing the age of A; for the spur may have developed its blossom bud at the end in either the first or second year of its life. That is, young fruit-spurs sometimes make a blossom bud the very year they start, but they oftener "stand still" the second year and delay the blossom bud until that time.

1894 Shoot grew from D to beyond E.

Side bud of 2 grew to 4, and made a fruit-bud on its end; the other side bud grew on to 5, and there made a fruit-bud.

Side bud of 7 grew on to 10, and the other one to 8, each ending in a fruit-bud.

Buds on old shoot—1 to 12—still remained dormant.

Some of the buds on the 1893 growth—12 to D—remained dormant, but some of them made fruit-spurs,—14, 16, 17, 18, 19, 20, 21, 22, 23.

1895. Shoot grew from beyond E to 28.

Flowers were borne at 4 and 5, but at 4 the fruit fell early, for the five or six scars of the flowers can be seen, showing that no one of them developed more strongly than the other; that is, none of the flowers "set." A fairly good fruit was probably borne at 5. At the base of each, a bud started to continue the spur next year.

Upon the other spur, flowers were borne both at 8 and 10. At 10 none of the flowers set fruit, but a side bud developed. At 8 the fruit partially matured, and a side bud was also developed.

The buds upon the old stem from 1 to 12 still remained dormant.

Some of the spurs on the 1893 growth—12 to D—developed fruit-buds for bearing in 1896.

Some of the buds on the 1894 growth—D to beyond E—remained dormant, but others developed into small fruit-spurs. One of these buds, near the top of the 1894 growth, threw out a long shoot, starting from E; and the bud at 26 also endeavored to make a long branch, but failed.

1896. Main shoot grew from 28 to the end.

The side bud below 4 (where the fruit was borne the year before), barely lived, not elongating, as seen above 3. This branch of the spur is becoming weak and will never bear again. The side bud of 5, however, made a fairly good spur and developed a fruit-bud at its end, as seen at 6.

The side bud of 10 grew somewhat, making the very short spur 11. This branchlet is also getting weak. The bud of 8, however, developed a strong spur at 9. Both 11 and 9 bear fruit-buds, but that on 11 is probably too weak ever to bear fruit again. In fact, the entire spurs, from 1 to 6 and 1 to 9, are too weak to be of much account for fruit-bearing.

This year several of the spurs along the 1893 growth—12 to D—bore flowers. Flowers were borne from two buds on the first one (at 13 and 14), but none of the flowers “set.” One of the little apples that died last June still clings to the spur, at 14. A side bud, 15, formed to continue the spur in 1897. Flowers were borne at 16, 20, 21 and 23, but no apples developed. Upon 16 and 20 the flowers died soon after they opened, as seen by the remains of them. Upon 23 one of the flowers set an apple, but the apple soon died. The spurs 17 and 18 are so weak that they have never made fruit-buds, and they are now nearly dead. The spurs 19 and 22 have behaved differently. Like the others they grew in 1894 and would have made terminal fruit-buds in 1895, and would have borne fruit in 1896; but the terminal buds were broken off in the fall or winter of 1894, so that two side buds developed in 1895, and each of these developed a fruit-bud at its end in 1896 in the spur 19, but only one of them developed such a bud in 22. Upon these spurs, therefore, the bearing year has been changed.

Upon the growth of 1894—D to beyond E—only three spurs have developed, Nos. 24, 25, 26. These started out in 1895, and two of them—25 and 26—have made large, fat buds which are evidently fruit-buds. The shoot at E grew on to EE, and all the buds on its lower two-year old portion remained dormant.

On the 1895 growth—from beyond E to 28—all the buds remained dormant save one, and this one—27—made only a very feeble attempt to grow into a spur.

The buds upon the 1892 growth—1 to 12—are still dormant and waiting for an opportunity to grow.

What an eventful history this apple twig has had! And yet in all the seven years of its life, after having made fifteen efforts to bear fruit, it has not produced a single good apple! The fault, therefore, does not lie in the shoot. It has done the best it could. The trouble has been that the farmer either did not give the tree enough food to enable it to support the fruits, or he did not prune the tree so as to give the twig light and room, or he allowed apple-scab or some other disease to kill the young apples as they were forming. I am wondering, therefore, if, when the trees fail to bear, it is not quite as often the fault of the farmer as it is of the trees?

TO THE TEACHER:

This is the third of a proposed series of leaflets designed to suggest methods of presenting nature-study upon common-place subjects. This is a new field of effort for the College of Agriculture, and we therefore look upon the methods as largely experimental. We are endeavoring to determine the best way of interesting children in country life. You can give us many suggestions, and we should like a free expression of your opinions and experiences. It should be borne in mind that the object of these lessons is not to impart direct and specific information, but to train the child in the powers of seeing and inquiring. We suggest that you familiarize yourself thoroughly with the apple twigs in these four lessons, and then collect a few twigs and examine them for yourself. When you think that you understand such twigs, collect some more (or have the children collect them), and giving each pupil one, conduct an observation on them. If this work is done now whilst the twigs are dormant, you will find the children to be greatly interested in the trees when the buds begin to burst. Once the inquiry is started, you will no doubt be able to conduct other similar observations from time to time. If questions come up which you cannot answer, write them to us and we may be able to help you.

We suggest that you ask your pupils to write short compositions upon these lessons and to make sketches of what they see, and that you send us some of these from time to time in order that we may learn how the experiment is working. We do not care for the best essays alone, but simply the average. The suggestions which we obtain from teachers will aid us greatly in the preparation of future leaflets.

TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

THE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY.

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

I. P. ROBERTS, DIRECTOR.

FIFTH EDITION.

No. 4

JUNE 1, 1897.

A Children's Garden.

BY L. H. BAILEY.

We want every school child in the State to grow a few plants this summer. We want everyone of them to learn something of why and how plants grow, and the best and surest way to learn is to grow the plants and to watch them carefully. We want everyone to become interested in everything that lives and grows. It does not matter so very much just what kinds of plants one grows, as it does that he grows something and grows it the best that he knows how. We want the children to grow these plants for the love of it,—that is, for the fun of it—and so we propose that they grow flowers; for when one grows pumpkins and potatoes, and such things, he is usually thinking of how much money he is going to make at the end of the season. Yet, we should like some rivalry in the matter in every school, and we therefore propose that a kind of a fair be held at the school house next September, soon after school begins, so that each child may show the flowers which he has grown. What a jolly time that will be!

Now, we must not try to grow too many things or to do too much. Therefore, we propose that you grow sweet peas and China asters. They are both easy to grow, and the seeds are cheap. Each one has many colors, and everybody likes them. Now let us tell you just how we would grow them.

1. *The place.*—Never put them—or any other flowers—in the middle of the lawn,—that is, not out in the center of the

yard. They do not look well there, and the grass roots run under them and steal the food and moisture. I am sure that you would not like to see a picture hung up on a fence-post. It has no background, and it looks out of place. The picture does not mean anything when hung in such a spot. In the same way, a flower bed does not mean anything when set out in the center of a lawn. We must have a background for it, if possible,—a wall upon which to hang it. So we will put the flower bed just in front of some bushes or near the back fence, or alongside the smoke-house, or along the walk at the side of the house or in the back yard. The flowers will not only look better in such places, but it will not matter so much if we make a failure of our flower bed; there are always risks to run, for the old hen may scratch up the seeds, the cow may break into the yard some summer night, or some bug may eat the plants up.

Perhaps some of the children may live so near to the school-house that they can grow their plants upon the school grounds, and so have sweet peas and asters where there are usually docks and smartweeds. Grow them alongside the fence, or against the schoolhouse if there is a place where the eaves will not drip on them.

2. *How to make the bed.*—Spade the ground up deep. Take out all the roots of docks and thistles and other weeds. Shake the dirt all out of the sods and throw the grass away. You may need a little manure in the soil, especially if the land is either very hard or very loose and sandy. But the manure must be very fine and well mixed into the soil. It is easy, however, to make sweet pea soil so rich that the plants will run to vine and not bloom well.

Make the bed long and narrow, but not narrower than three feet. If it is narrower than this, the grass roots will be apt to run under it and suck up the moisture. If the bed can be got at on both sides, it may be as wide as five feet.

Sow the seeds in little rows crosswise the bed. The plants can then be weeded and hoed easily from either side. If the rows are marked by little sticks, or if a strong mark is left in the earth, you can break the crust between the rows (with a

rake) before the plants are up. The rows ought to be four or five inches further apart than the width of a narrow rake.

3. *How to water the plants.*—I wonder if you have a watering-pot? If you have, put it where you cannot find it, for we are going to water this garden with a rake! We want you to learn, in this little garden, the first great lesson in farming,—how to save the water in the soil. If you learn that much this summer, you will know more than many old farmers do. You know that the soil is moist in the Spring when you plant the seeds. Where does this moisture go to? It dries up,—goes off into the air. If we could cover up the soil with something, we should prevent the moisture from drying up. Let us cover it with a layer of loose, dry earth! We will make this covering by raking the bed every few days,—once every week anyway, and oftener than that if the top of the soil becomes hard and crusty, as it does after a rain. Instead of pouring water on the bed, therefore, we will keep the moisture in the bed.

If, however, the soil becomes so dry in spite of you that the plants do not thrive, then water the bed. Do not *sprinkle* it, but *water* it. Wet it clear through at evening. Then in the morning, when the surface begins to get dry, begin the raking again to keep the water from getting away. Sprinkling the plants every day or two is one of the surest ways to spoil them.

4. *When and how to sow.*—The sweet peas should be put in just as soon as the ground can be dug, even before frosts are passed. Yet, good results can be had if the seeds are put in as late as the 10th of May. In the sweet pea garden at Cornell last year, we sowed the seeds on the 20th of April. This was about right. The year before, we sowed them on the 30th. If sown very early, they are likely to bloom better, but they may be gone before the middle of September. The blooming can be much prolonged if the flowers are cut as soon as they begin to fade.

Plant sweet peas deep,—two to three or sometimes even four inches. When the plants are a few inches high, pull out a part of them so that they will not stand nearer together than six inches in the row. It is a good plan to sow sweet peas in

double rows,—that is, put two rows only five or six inches apart—and stick the brush or place the chicken-wire support between them.

China asters may be sown from the middle of May to the first of June. In one large test at Cornell, we sowed them the 4th of June and had good success, but this is rather later than we would advise. The China asters are autumn flowers, and they should be in their prime in September and early October.

Sow the aster seed shallow,—not more than a half inch deep. The tall kinds of asters should have at least a foot between the plants in the row, and the dwarf kinds six to eight inches.

Sometimes China asters have rusty or yellow spots on the undersides of their leaves. This is a fungous disease. If it appears, have your father make some ammoniacal carbonate of copper solution and then spray them with it; or Bordeaux mixture will do just as well or better, only that it discolors the leaves and flowers.

5. *What varieties to choose.*—In the first place, do not plant too much. A garden which looks very small when the pussy-willows come out and the frogs begin to peep, is pretty big in the hot days of July. A garden four feet wide and twenty feet long, half sweet peas and half asters, is about as big as most boys and girls will take care of.

In the next place, do not get too many varieties. Four or five kinds each of peas and asters will be enough. Buy the named varieties,—that is, those of known colors—not the mixed packets. If you are very fond of reds, then choose the reddest kinds; but it is well to put in at least three colors. The varieties which please you may not please me or your neighbor, so that I cannot advise you what to get, but I will give some lists which may help you.

Amongst all the sweet peas grown at Cornell last year, the following seemed to be best on our grounds:

Dark purple.

Waverly.

Duke of Clarence.

triped purple.

Gray Friar.

Juanita.

Senator.

Lavender.	<i>Countess of Radnor.</i> <i>Dorothy Tennant.</i> <i>Lottie Eckford.</i>
White.	<i>The Bride.</i> <i>Emily Henderson.</i> <i>Queen of England,</i> ³ / ₂ <i>Alba Magnifica.</i>
Primrose.	<i>Mrs. Eckford.</i>
White flushed with pink.	<i>Blushing Beauty.</i> <i>Katherine Tracy.</i> <i>Eliza Eckford.</i>
Striped or flaked pink.	<i>Ramona.</i> <i>Mrs. Joseph Chamberlain.</i>
Orange-pink.	<i>Lady Penzance.</i> <i>Meteor.</i>
Rose-pink.	<i>Her Majesty.</i> <i>Splendor.</i> <i>Apple Blossom.</i> <i>Borcatton.</i>
Rose-pink shaded with orange.	<i>Firefly.</i> <i>Princess Victoria.</i>

At another place or in another season these varieties might not have given us the most satisfaction; but these names suggest some of the colors, if one does not happen to have a seedsman's catalogue handy.

Of China asters, the Comet type—in various colors—will probably give the most satisfaction. They are mostly large-growing kinds. Other excellent kinds are the Perfection and Peony-flowered, Simple or Branching, Chrysanthemum-flowered, Washington, Victoria, and, for early, Queen of the Market. Odd varieties are Crown, German Quilled, Victoria Needle and Lilliput. Very dwarf kinds are Dwarf Bouquet or Dwarf German, and Shakespeare.

Anyone who wants to know more about sweet peas may have our Bulletins 111 and 127, and for China asters Bulletin 90. Our Bulletin 121 has instructions about laying out yards. Instructions on spraying, with formulas, are contained in Bulletin 114.

Now, let us see how many little boys and girls in New York State will raise sweet peas and China asters this year! And we should like them to write us all about it.



23.—*A clump of weeds in the corner by the house,—motherwort and Virginia creeper. How pretty they are!*

TO THE TEACHER:

Will you not help us to interest the children in the life of the gardens and fields? We suggest that you read this simple leaflet to them; and if any of them want a copy for themselves, tell us how many you want and we shall be glad to send them to you.

The leaflets which we have previously issued are:

1. *How a squash plant gets out of the seed.*
2. *How a candle burns.*
3. *Four apple twigs.*

You will receive one upon insects in a few days.

Address,

Chief Clerk,

College of Agriculture,

Ithaca, N. Y.

ITHACA, N. Y., May 11, 1897.

The demand for "The Children's Garden" still continuing, and the season for sweet pea planting being past, it seems to be necessary to say that there are many interesting and satisfactory kinds of flowers which still can be sown. The China Aster (which we have recommended) may still be planted. One of the chief merits of this plant for our purpose is the lateness of bloom, allowing the flowers to be used in the schools after they open in the fall. An excellent flower for sowing during May is the common annual Phlox (*Phlox Drummondii* of the catalogues). Poppies are also satisfactory, but the flowers do not last long. Petunias are also excellent. Balsams, Clarkias, Coreopsis (or Calliopsis), and Zinnias may still be sown.

TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

THE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY,

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

I. P. ROBERTS, DIRECTOR.

THIRD EDITION.

No. 5.

JUNE 1, 1897.

Some Tent-Makers.

BY ANNA BOTSFORD COMSTOCK.

It is unfortunate that there is, throughout the country, a prevailing dislike for the small creatures called "worms." This dislike is, in most instances, the result of wrong training and is by no means a natural instinct. As evidence of this, witness the joy with which the small boy or even the small girl, handles "bait" when preparing to go fishing; although of all common "worms" surely the angle-worm is least attractive from any point of view. A still more striking example is the hardihood with which young fishermen catch the "dobson" to use as a lure for bass,—for the "dobson" is not only very ugly in appearance but is also vicious, often pinching severely the careless fingers of its captors. Thus the dislike for insects being the result of the point of view, it should be the first duty of the teacher to remove this repulsion. In the lesson which follows there is no occasion for teacher or pupil to touch the insects unless they choose to do so; but an attempt is made to arouse an interest in the habits and ways of insect life. If we can succeed in arousing the child's interest in the actions of a caterpillar, he will soon forget his dislike for the "little brothers" which live upon foliage and which experience miraculous changes of form during their short lives.

In selecting the Apple-tree Tent Caterpillar for this first lesson upon insects, we have been guided by the following facts: First, it is to be found in early spring; second, its life-history from

egg to cocoon is accomplished within the limits of the spring term of our schools: third, it is common everywhere; fourth, it is an important insect from an economic point of view, and the children may be taught how to keep it out of the orchards, thus making the lesson of practical use.

In this lesson the teacher is encouraged to use her own methods and originate new ones to make the work interesting. The leaflet is meant for the exclusive use of the teacher and the text should not be shown to the pupils. The pictures on the last page* are to be shown to the pupils at the teacher's discretion. When answers are herein given to the questions asked, they are meant to aid the teacher in drawing out the correct replies from the children.

MATERIALS NEEDED.

1. A pocket lens or a tripod lens is desirable, but not a necessity. These may be bought from or ordered through any jeweler or bookseller. They cost from twenty-five cents to one dollar apiece. It is well worth while to any teacher to possess one of these magnifiers as a means of interesting her pupils in many ways.

2. A bottle, a broad bottomed one being preferable, so that it will not tip over easily. This bottle is to be filled with water in which a small branch of the apple-tree may be placed to keep it fresh. A common ink bottle will do to begin with. Fig. 24.

3. A wooden or pasteboard box, twelve or fourteen inches square,—a soap box or hat box will do. In place of a cover, nail or paste mosquito netting or cheese cloth over the top; remove the bottom so the box may be placed over the bottle and

24. *The bottle with the twigs bearing the egg masses. The tent is being woven below.*

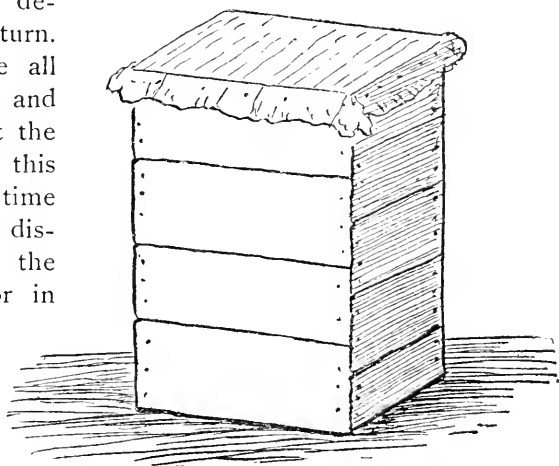
* Teachers who desire to take up this teaching should write us for enough extra sheets of page 47 to supply the scholars.

the branch of apple in it. This is called a breeding-cage and its use is to keep the insects from straying about the school-room. Fig. 25.

4. A twig bearing the egg mass of the tent caterpillar. Fig. 27. These are easily found before the leaves appear on apple trees or on wild cherry.

METHODS OF USING THIS LEAFLET.

The teacher should give the pupils a preliminary talk upon tents. Speak of the tents used by Indians, by armies, by circuses, by campers, and describe them each in turn. The teacher should use all the facts at her disposal, and all her ingenuity to get the children interested in this subject. Spend a little time for two or three days in discussing tents, and get the pupils to tell orally or in essays all they know about tents. When sufficient interest is thus aroused tell them this: "The reason we have talked about tents is because we are going to



25. *The breeding cage.*

study some little folks who make tents and live in them. Their tents are not made of bark like the Indian's or of canvas like the soldier's, but are made of the finest silk, which is spun and woven by the tenters themselves. These silken tents are not pitched upon the ground and fastened down by ropes and pegs, for these folk, like the Swiss Family Robinson, live in trees. Many people live in one of these tree tents, and they are all brothers and sisters. Now, just where these tents are made and how they are made, and what sort of little people make them are things which we will find out if we watch carefully and patiently."

LESSON I.—THE EGGS. (Fig. 27.)

The teacher having found the egg mass should show it to the pupils and let them, during play hours, collect some for themselves. Say that they are eggs, but explain no farther. Get the children to examine the egg masses and ask the following questions:

On what portion of the trees are these egg masses found ?

What is the shape of the egg mass ? (Bring out the fact that they look like a portion of the twig swollen or budded.)

What is the color of the egg mass ?

Is there much difference in color between the egg mass and the branch ?

Has this similarity in color any use ? (Develop the idea that the shape and color of the egg mass makes it resemble the twig so closely as to hide it from birds or any animal that would be likely to eat the eggs.)

Does the egg mass shine ?

Why does it shine ?

Ans. Because there is a coat of varnish around the eggs.

Why was varnish put around the eggs ? (Get the answer by asking why varnish is put upon wood. Varnish is put around the eggs to preserve them and keep them dry during the rains and snows of autumn and winter.)

If the eggs are near the hatching period the varnish will have scaled off, revealing the tiny white eggs ; if not, let the teacher remove the varnish with a knife or pin, thus exposing the eggs. If the teacher has a lens the children should view the eggs through it. Exhibit the picture, Fig. 28, which represents the eggs greatly enlarged, showing the net work of cement which holds them in place. Ask the children to compare the shape of these eggs with that of bird eggs, and bring out the fact that these are thimble-shaped. Then ask the pupils to guess what sort of a mother laid these eggs, cemented them fast with a net work and then covered them with a coat of waterproof varnish. After sufficient interest is aroused on this point, say to them : "One day last July a little moth or miller was flitting about the

tree from which these twigs were taken. If we could have been there and caught her we would have found her a pretty little creature with four wings covered with down and a soft fuzzy body. In color she was a pale rosy-brown, and had two bands of pale yellow across each front wing." (Call attention to the picture of the moth, Fig. 31.*)

"This is the little mother which laid her eggs in a ring around the twig and covered them with a water-proof coat to keep them safe and sound until this spring, when they will hatch."

What will come out of these eggs when they hatch? The teacher should not answer this question but let the pupils watch the eggs and discover the answer for themselves.

Place the twig with the egg mass upon it in the bottle of water (Fig. 24). It will be best if this twig is a part of a forked branch, so that the caterpillars may make their web upon it. As soon as the eggs hatch, ask the following questions:

What sort of young ones hatch out of the eggs?

Are they like their mother?

What color are they?

Why are their heads so large?

Ans. So that they can gnaw the lid off the egg and thus get out.

Why should the young ones of a pretty moth be little black caterpillars?

(Leave this answer for future investigation.)

After the caterpillars hatch, it will be necessary to bring in fresh apple twigs with buds and leaves upon them each day so as to feed the little prisoners. It is very desirable that they be kept alive until they have begun their web and have molted at least twice. If they show a disposition to wander off put the breeding cage, Fig. 25, over the bottle and branch and so keep them confined with their food.

To supplement the study of the imprisoned caterpillars, study should be made at the same time of the insects out of doors and

* If a specimen of the moth could be obtained it would be much more interesting to the children than the picture. The teacher can collect or breed the moths in July to use the next spring to illustrate the lesson.

under natural conditions. If none appear upon an apple or wild cherry tree near the school-house, the teacher should transfer a colony to such a tree (Fig. 26). This may be done by fastening a twig with an egg mass upon it to a branch of the tree. If too late to get the unhatched eggs, get a nest with the small worms

in it and tie that to the convenient branch instead. This study of the insects out of doors is very necessary in discovering their normal habits.

LESSON II.
THE CATERpillARS.
(Fig. 29.)

If the eggs hatch before the leaves appear, upon what do the caterpillars feed?

How long after hatching before the caterpillars commence to make their tent?

Where is the tent always formed?

Ans. In the fork of the branches.

Why is this so?

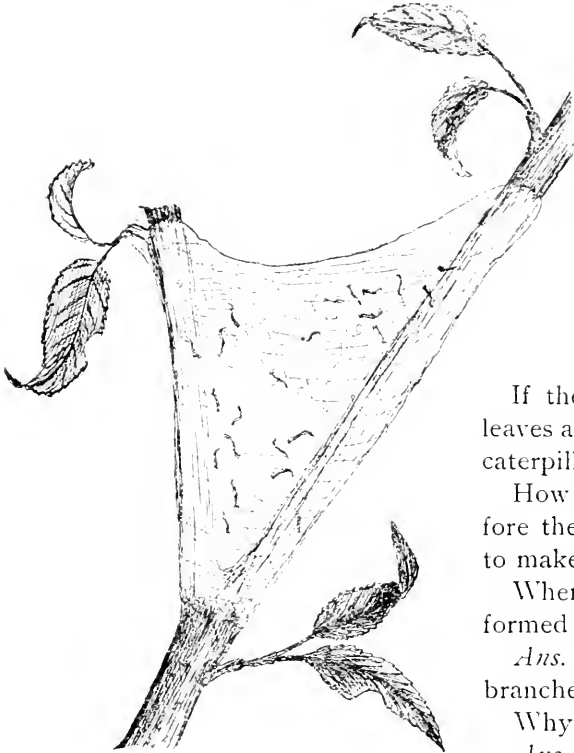
Ans. The forking branches offer a convenient support upon which to stretch the tent and

26. *A young colony of tent-makers upon a cherry tree.*

when, as is the case out of doors, the tent is spread in a fork of the larger limbs, these limbs afford two branching roads for the caterpillars to follow in searching for food.

Let the pupils make drawings of the tent as soon as it is large enough to be seen well.

What is the color of the caterpillars when they are a week old?
Upon what do they feed?



At what time of day do they feed?

When on a tree, how far from their tent do they go for their food?

Are the paths over which the caterpillars travel when searching for food marked in any way?

Ans. This caterpillar spins a silken thread wherever it goes and therefore leaves a trail of silk behind it.

Of what is the tent made?

Compare the tent with a spider's web and note the differences.

Where does the silk come from, of which the tent is made?

Ans. The silk glands of the caterpillar are situated near the mouth, while those of the spider are on the rear end of the body.

LESSON III. HOW THE INSECTS GROW.

The caterpillars shed their skins about five times. The first molt occurs about three days after they hatch. The second molt about four days later; and the third molt about six days after the second. After each molt, the color and markings of the caterpillars are somewhat changed. During some of the molts the pupils should watch a caterpillar change his skin. After the class has seen this operation the teacher may give the following lesson:

Where is your skeleton?

What is it made of?

What is it for? Bring out the fact that the skeleton is a support for the muscles and organs of the body.

Where is an insect skeleton? Get as many answers to this question as possible, then say:

The insect's skeleton is on the outside of its body instead of a skin, and the flesh and muscles are supported by it on the inside instead of on the outside like our own. As this skeleton is hard, it cannot stretch; as the insect grows and gets too large it bursts open and the insect walks out of it. Now, underneath this old, hard skeleton a new one is formed which is soft and flexible at first and so stretches to accommodate the growing insect. After a little time this new skeleton also

hardens and has to be shed when it is too small to suit its owner.

Notes should be made by the pupil upon the change of color and markings after the different molts and the process of molting should be described.

LESSON IV. THE PUPA. (Fig. 30.)

In ordinary seasons, about the middle of May the caterpillars get their growth. If those in the breeding cage have died or have not thriven, bring in a few full grown caterpillars from the orchard and put them on some branches in the breeding cage. Give them fresh food each day as long as they will eat; also place some sticks and chips around on the bottom of the breeding cage for the worms to "spin up" upon. Then have the children observe the following things:

How do the caterpillars begin their cocoons.

Where are the cocoons made?

How are they made?

Draw a picture of a cocoon?

About a week after a cocoon is made open it carefully with a pair of scissors so as not to hurt the inmate and let the pupils see the change that has come over the caterpillar.

Have the pupils describe the pupa.

Let the pupils make drawings of the pupa.

The moths will hardly emerge from the cocoons until after the close of the school term. The children should be encouraged to gather the cocoons off the fences around the orchards and off the sticks and branches upon the ground and to carry them home. The cocoons may be placed in pasteboard boxes and kept until the moths emerge, about the middle of July.

LESSON V. DESTROYING THE CATERPILLARS.

After the caterpillars are fully grown and all the processes of growth have been observed by the pupils, the teacher should give a lesson upon the injury which they do to trees and the necessity of keeping the orchards free from these pests. This

lesson should be given guardedly so as not to encourage the children to cruelty in killing insects. The teacher should always try to inculcate in the child reverence for life, that wonderful force, which we can so easily take from a creature but which we may never give back. It is better to appeal to the child's sense of justice in giving this lesson. The teacher may vary it to suit her own ideas, but in substance it might be given as follows :

"All life is sacred ; the smallest worm has as good a right to live in the sight of God as you or any child has. Life should never be taken except when necessary. However, no being has the right to interfere with the rights of another. Neither the child nor the worm has any right to trespass upon the property of any one else."

"Let us see whether these caterpillars are trespassers or not. The farmer works hard to earn the money to buy the land upon which the orchard is planted ; he works hard to earn the money with which to buy the young trees ; he works hard to set out the trees and cultivate the orchard : therefore the orchard and the fruit of it are his property, and he has a right to drive away all thieves. If men or children steal the fruit, he has a right to appeal to the law and have them fined or imprisoned. If worms come and injure the tree by eating up the foliage, he has a right to keep them out if he can. The leaves are necessary to the tree, for if they are destroyed the tree cannot get the air it needs to keep it vigorous and enable it to mature its fruit. We have seen that these caterpillars destroy the leaves, and thus do great injury to the apple crop. We therefore have a right to destroy these little robbers, as that is the only way we can keep them out of our orchards."

How may they be destroyed ?

The egg masses may be collected in winter and early spring from young orchards, and be burned.

In old, large trees we must wait until later. Ask the pupils the following questions :

At what times did we find the worms in their tents? *Ans.* Early morning, late afternoons, and during cold, dark days.

If we should destroy the tents in the middle of a warm,

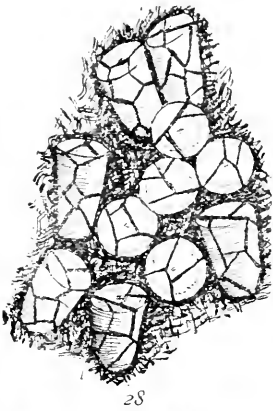
sunny day, what would happen? *Ans.* The caterpillars, being out feeding on the leaves, would not be hurt, and as soon as they came back would make another tent.

If the tent is destroyed in the early morning or late afternoon or on a cold, dark day, what would happen? *Ans.* The caterpillars, all being in the tent, would be destroyed. How may the tents be destroyed? *Ans.* By wiping them out with a long pole on one end of which is wound a rag saturated with kerosene. Or by burning them out with a torch.

Is it best to destroy the caterpillars early in the season, before they have done much damage, or to wait until they are large and have done all the damage they can?

If the trees were sprayed with Paris-green in the early spring, what would happen? *Ans.* The caterpillars would be killed as soon as they commenced to eat, when they were first hatched.

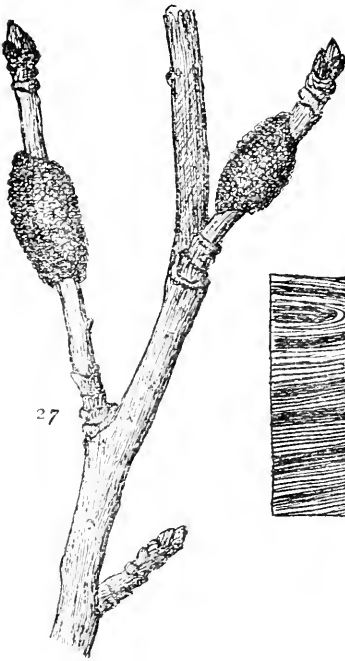
When these caterpillars feed upon the leaves of wild cherry they are doing no damage to an orchard. Therefore, when the tents appear on wild cherry trees have we any right to destroy them? *Ans.* The wise and careful farmer does not allow wild cherry trees to grow along his fences, to become breeding places for insect enemies which will next year attack his orchards.



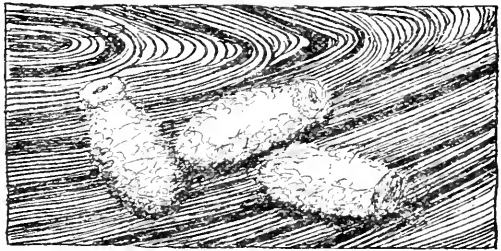
28



29



27



30



31

THE CURIOUS HISTORY OF A TENT CATERPILLAR.

27. The masses of eggs upon the twigs of an apple tree. 28. The eggs enlarged. 29. A full-grown caterpillar. 30. Cocoons. 31. The moth, or adult insect.

TO THE TEACHER :

The following leaflets have been issued to aid teachers in the public schools in presenting nature-study subjects to the scholars at odd times.

1. *How a squash plant gets out of the seed.*
2. *How a candle burns.*
3. *Four apple twigs.*
4. *A children's garden.*
5. *Some tent-makers.*

*Address,
Chief Clerk,
College of Agriculture,
Ithaca, N. Y.*

TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

THE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY,

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

I. P. ROBERTS, DIRECTOR.

SECOND EDITION.

No 6.

JUNE 1, 1897.

What is Nature-Study ?

BY I. H. BAILEY.

It is seeing the things which one looks at, and the drawing of proper conclusions from what one sees. Nature-study is not the study of a science, as of botany, entomology, geology, and the like. That is, it takes the things at hand and endeavors to understand them, without reference to the systematic order or relationship of the objects. It is wholly informal and unsystematic, the same as the objects are which one sees. It is entirely divorced from definitions, or from explanations in books. It is therefore supremely natural. It simply trains the eye and the mind to see and to comprehend the common things of life ; and the result is not directly the acquirement of science but the establishment of a living sympathy with everything that is.

The proper objects of nature-study are the things which one oftenest meets. To-day it is a stone ; to-morrow it is a twig, a bird, an insect, a leaf, a flower. The child, or even the high school pupil, is first interested in things which do not need to be analyzed or changed into unusual forms or problems. Therefore, problems of chemistry and of physics are for the most part unsuited to early lessons in nature-study. Moving things, as birds, insects and mammals, interest children most and therefore seem to be the proper subjects for nature-study ; but it is often difficult to secure specimens when wanted, especially in liberal quantity, and still more difficult to see the objects in perfectly natural conditions. Plants are more easily

had, and are therefore more practicable for the purpose, although animals and minerals should by no means be excluded.

If the objects to be studied are informal, the methods of teaching should be, also. If nature-study were made a stated part of a curriculum, its purpose would be defeated. The chiefest difficulty with our present school methods is the necessary formality of the courses and the hours. Tasks are set, and tasks are always hard. The only way to teach nature-study is, with no course laid out, to bring in whatever object may be at hand and to set the pupils to looking at it. The pupils do the work,—they see the thing and explain its structure and its meaning. The exercise should not be long,—not to exceed fifteen minutes at any time, and, above all things, the pupil should never look upon it as a recitation, and there should never be an examination. It should come as a rest exercise, whenever the pupils become listless. Ten minutes a day, for one term, of a short, sharp and spicy observation upon plants, for example, is worth more than a whole text-book of botany.

The teacher should studiously avoid definitions, and the setting of patterns. The old idea of the model flower is a pernicious one, because it really does not exist in nature. The model flower, the complete leaf, and the like, are inferences, and pupils should always begin with things and not with ideas. In other words, the ideas should be suggested by the things, and not the things by the ideas. "Here is a drawing of a model flower," the old method says; "go and find the nearest approach to it." "Go and find me a flower," is the true method, "and let us see what it is."

Every child, and every grown person too, for that matter, is interested in nature-study, for it is the natural method of acquiring knowledge. The only difficulty lies in the teaching, for very few teachers have had any drill or experience in this informal method of drawing out the observing and reasoning powers of the pupil wholly without the use of text-books. The teacher must first of all feel the living interest in natural objects which it is desired the pupils shall acquire. If the enthusiasm is not catching, better let such teaching alone.

All this means that that the teacher will need helps. He will need to inform himself before he attempts to inform the pupil. It is not necessary that he become a scientist in order to do this. He simply goes as far as he knows and then says to the pupils that he cannot answer the questions which he cannot. This at once raises the pupil's estimation of him, for the pupil is convinced of his truthfulness, and is made to feel—but how seldom is the sensation!—that knowledge is not the peculiar property of the teacher but is the right of any one who seeks it. It sets the pupil investigating for himself. The teacher never needs to apologize for nature. He is teaching only because he is an older and more experienced pupil than his pupil is. This is just the spirit of the teacher in the universities to-day. The best teacher is the one whose pupils farthest outrun him.

In order to help the teacher in the rural schools of New York, we have conceived of a series of leaflets explaining how the common objects can be made interesting to children. Whilst these are intended for the teacher, there is no harm in giving them to the pupil; but the leaflets should never be used as texts to make recitations from. Now and then, take the children for a ramble in the woods or field, or go to the brook or lake. Call their attention to the interesting things you meet—whether you yourself understand them or not—in order to teach them to see and to find some point of sympathy; for everyone of them will some day need the solace and the rest which this nature-love can give them. It is not the mere information which is valuable; that may be had by asking someone wiser than they, but the inquiring and sympathetic spirit is one's own.

The pupils will find their lessons easier to acquire for this respite of ten minutes with a leaf or an insect, and the school-going will come to be less perfunctory. If you must teach drawing, set the picture in a leaflet before the pupils for study, and then substitute the object. If you must teach composition, let the pupils write upon what they have seen. After a time, give ten minutes now and then to asking the children what they saw on their way to school.

Now, why is the College of Agriculture of Cornell University interesting itself in this work? It is trying to help the farmer, and it begins with the most teachable point,—the child. The district school cannot teach agriculture any more than it can teach law or engineering or any other profession or trade, but it can interest the child in nature and in rural problems and thereby fasten its sympathies to the country. The child will teach the parent. The coming generation will see the result. In the interest of humanity and country, we ask for help.

TO THE TEACHER :

The following leaflets have been issued to aid teachers in the public schools in presenting nature-study subjects to the scholars at odd times.

1. *How a squash plant gets out of the seed.*
2. *How a candle burns.*
3. *Four apple twigs.*
4. *A children's garden.*
5. *Some tent-makers.*
6. *What is nature-study ?*

Address,

Chief Clerk,

College of Agriculture,

Ithaca, N. Y.

TEACHER'S LEAFLETS

FOR USE IN THE PUBLIC SCHOOLS.

PREPARED BY

THE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY,

ITHACA, N. Y.

Issued under Chapter 128
of the Laws of 1897.

I. P. ROBERTS, DIRECTOR.

No. 7.

JUNE 1, 1897.

Hints on Making Collections of Insects.

BY ANNA BOTSFORD COMSTOCK.



It is the purpose of this leaflet to give a few suggestions to aid those pupils of the secondary schools, who desire to make collections of insects.

There are several good reasons why children should be encouraged to make collections of flowers, birds and insects; and the least of these reasons is the possession of such a collection on the part of the child. Making a collection of natural history specimens should only be the means to an end, *i. e.*, training the child to observe. When eyes are opened to the wonders of nature, every roadside, brook, and woodland is fraught with interest which is undreamed of to those who are nature-blind. It is sad to think of the hosts of people who go through this beautiful world having eyes but seeing not, having ears but hearing not. The eyes must be unsealed in youth, when the mind is alert and receptive if the man or woman is to find in later life that nature is not only a resource and recreation but an ever faithful friend holding out comforting arms to those who are weary in soul and body.

Not only does the study of nature open the child's eyes, but it also teaches him the value of accuracy. The young naturalist

soon understands that an observation is worth nothing unless it is truthful. On the other hand, nature-study cultivates the imagination. The wonders in the lives of insects, plants and birds are so illimitable that almost anything *seems* possible. Few indeed are the studies wherein the fire kindled by imaginative *seeming* is guarded and checked by the facts of actual *seeing*.

There are a few points in favor of beginning with insects when the child first attempts making a collection of natural objects. Insects are to be found everywhere and are easily caught; and it requires no technical skill to preserve them as is the case with birds; while they retain their natural forms and colors better than do flowers. To secure the desired results for the pupil when he is making his collection of insects the teacher should take care that he makes his observations incidentally; thus subserving the true methods of nature-study, which is to teach the child while he remains unconscious of the fact that he is being taught. The teacher should therefore ask the young collector "Where did you catch this butterfly?" "Where did you find this beetle?" "Upon what plant or flower did you find this bug?" "Did you hear this cricket chirp? If so, how did he do it?" etc., etc. Thus making him tell orally or in a written language lesson the things he has seen while collecting. The differences in the appearance and structure of the insects caught should also be brought out by questions. These questions may be adapted to pupils of any age and the success of this part of the work must ever depend upon the interest and genius of the teacher.

The objection is sometimes raised that collecting and killing insects and birds incite the child to cruelty and wanton destruction of life. This seems good *a priori* reasoning but experience does not confirm it. We have always found that those who collect and take an interest in insect life are much more careful about killing or hurting insects than are other people; the entomologist of all men taking the greatest pains to avoid stepping upon the caterpillar or cricket in his path; also the young ornithologists who have come under our observation show the greatest devotion to the rights and interests of birds. Our experience is that as soon as the child begins to take an interest in insects he begins to see matters from their point of view and this insures a proper regard for their right to life. It will be well, however, for the teacher to impress upon the pupil that he should kill no insect that is not desired for his collection.

DIRECTIONS FOR COLLECTING AND PRESERVING INSECTS.

The articles necessary for collecting insects are few and inexpensive. One net and one killing bottle may do service for a grade or an entire country school, thus reducing the expense to a minimum.

INSECT NET. Fig. 1.

Materials required:

1. A handle about three feet long; an old broom handle will do.
2. A piece of tin three inches wide, long enough to reach around the handle.
3. A piece of No. 3 galvanized wire 3 ft. 6 in. long.
4. $\frac{1}{6}$ yard of heavy sheeting.
5. $\frac{3}{4}$ yard of cheese cloth.

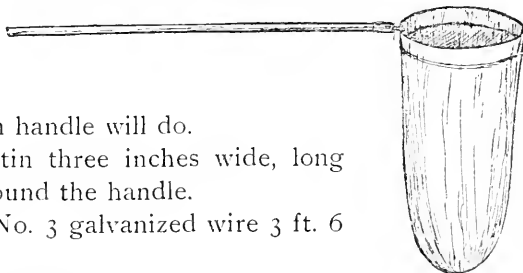


FIG. 1. *Insect net.*

Bend the wire into a ring about a foot in diameter and bend back about 3 inches of each end of the wire so they may be inserted into a hole drilled into the end of the handle. The piece of tin should be fastened around the end of the handle where the wire is inserted to hold it securely in place. If practicable a tinsmith should be called upon to help in bending the wire and fastening it to the handle. After this is done take the sheeting and fold it over the wire double, using only enough to fit around the wire without gathering; the object of this heavy cloth is to prevent the net from wearing out quickly. Make the cheese cloth into a bag with rounded bottom and just wide enough to fit the facing of sheeting to which it should be sewed securely, and the net is finished.

HOW TO USE THE NET.

The net must be swung swiftly to be successful. Insects have many eyes and are very wide-awake and have no desire to be caught; therefore, the collector must be very active if he gets anything. One method of using the net is called "sweeping"; to do this take the handle about a foot and a half above the ring and pass the net quickly back and forth,

striking it against the grass in front of you as you walk through open fields; the net must be turned at each stroke and kept in rapid motion or the insects will escape. After a time the net should be examined and the insects put in the killing bottle.

Another method of using the net is called "beating." This method is used in collecting insects from bushes and consists of lifting the net, mouth upward, and striking it sharply against the branches or leaves, thus jarring the insects into it.

To use the net in water sweep the water plants as quickly as possible. In running streams overturn stones, holding the net just below them with the mouth up stream. An old dipper made into a sieve by perforating the bottom with an awl is a good utensil for collecting water insects.

THE KILLING BOTTLE, FIG. 2.

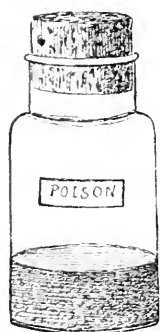


FIG 2. *Killing bottle.*

It is desirable to kill the insects in a humane way so that they will not suffer by the process; it is also desirable that they should not revive after they are pinned, both for their own sakes as well as for the sake of the feelings of the collector. The best way to secure painless and sure death for the insects is by the means of a "cyanide bottle."

Materials needed for a killing bottle :

1. A bottle with a wide mouth; a morphine bottle or a small olive or pickle bottle will do. Even a glass fruit-can holding a pint will answer very well, although taking off and putting on the cover consumes more time than is desirable.
2. A cork that will fit the bottle tightly and is long enough to handle easily.

3. Two cents' worth of cyanide of potassium.

4. One cent's worth of plaster of Paris.

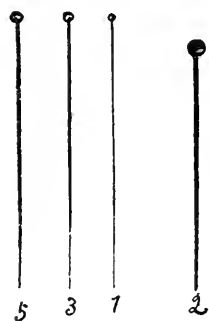
These latter materials may be procured from any drug store.

Place the lump of cyanide of potassium in the bottle and pour in enough water to cover it. Add immediately enough plaster of Paris to soak up all the water; leave the bottle open in a shady

place for an hour and then wipe the dry plaster of Paris from its sides, put in the cork, and it is ready for use. The plaster of Paris forms a porous cement which, while it holds the cyanide fast in the bottom, also allows the fumes of the poison to escape and fill the bottle. It should be labeled "poison." If kept corked when not in use a killing bottle made like this will last a whole season.

The first rule in using the killing bottle is this: Do not kill any more insects than you need for your collection. The second rule is: do not breathe the fumes of the bottle; for they smell badly and are not good for you. When you uncork the bottle to put an insect in it hold it away from your face and cork it up again as quickly as possible.

Some insects may be caught from flowers, etc., directly into the bottle by holding it uncorked beneath them for a moment; the fumes of the poison soon overcome them and they drop into the bottle. In taking insects from the net take the bottle in the right hand and the cork in the left; insert the bottle into the net and place the mouth of it over an insect crawling on the inside of the net, then put the cork on the outside of the net into the mouth of the bottle, net and all, for a moment until the insect falls into the bottom of the bottle; then remove the cork and take the rest of the imprisoned insects in the same way. Insects should be left in the bottle at least an hour, and may be left in there over night without injury to the specimens.



INSECT PINS. FIG. 3.

After the insects are caught they should be pinned so that they may be arranged in the collection in an orderly manner. Common pins are not good for pinning insects; they are too thick and they corrode very soon, covering the specimens with verdigris. Regular insect pins are desirable as they are very slender and do not corrode so quickly. These may be obtained of any dealer in entomological supplies at a cost of fifteen cents per hundred.

Ask for the German insect pins Nos. 1, 3 and 5. If these pins are too expensive you

FIG. 3. *Insect pins*
1, 3, 5, are German
insect pins. 2, is a
steel mourning
pin.

can use the black steel mourning pins. These come in shallow boxes one by two inches square and have round glass heads and the boxes are labeled "Germany"; these may be procured from any dry goods store. However, insects pinned with any beside regular insect pins cannot be sold or exchanged.

All insects except beetles should be pinned through that part of the body just back of the head as shown in Figs. 11, 13, 14, 15. Beetles should be pinned through the right wing-cover as shown in Fig. 12. About one-fourth of the pin should project above the back of the insect. Very small insects may be gummed to a narrow strip of cardboard and the pin put through the cardboard.

LABELING SPECIMENS.

Specimens should be labeled with the date of capture and the locality. Thus the butterfly, Fig. 15, would be labeled thus:

Ithaca, N. Y.

Aug. 12, 1896.

The paper on which this label is written should be slipped upon the pin with which the butterfly is pinned and placed just below the insect. Labels should be as small as possible and neatly cut.

INSECT BOXES.

For the beginner nothing is more convenient than an empty cigar box, which may be obtained at any store where cigars are sold. (Fig. 4.) The bottom of the box should be covered with

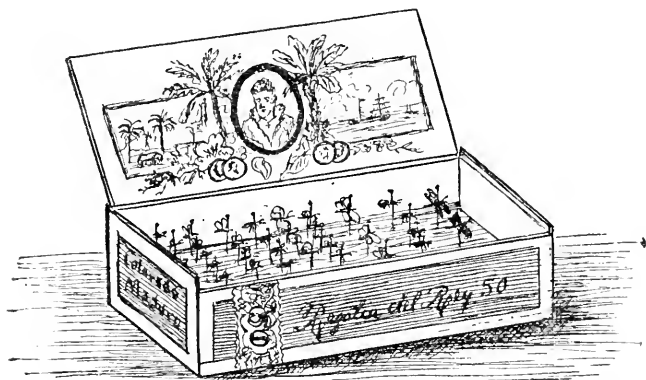


FIG. 4. A convenient box for the use of the young collector.

some soft, firm material into which pins may be pushed without bending them. There are many such materials. Sheet cork or pressed peat may be obtained of dealers in entomological supplies. Some ingenious boys use regular bottle corks cut into cross sections about $\frac{1}{4}$ inch thick. Others take the pith of dried corn-stalks divided in half lengthwise. The cheapest and most easily procurable of the purchasable materials is cork linoleum. This is for sale in most carpet stores. Get the quality that is about $\frac{1}{4}$ inch thick which costs about \$1 per yard; put it into the box cork-side up. Any of these materials may be fastened to the bottom of the box with glue or with tacks. In all cases they should be covered neatly with white paper for the insects appear better against a white background.

For permanent collections the wooden boxes with glass tops are much safer; and as the insects may be seen through the glass these boxes are more practical for school collections. This kind of a box is shown in Fig. 5. Its sides are 18 by 16 inches and its

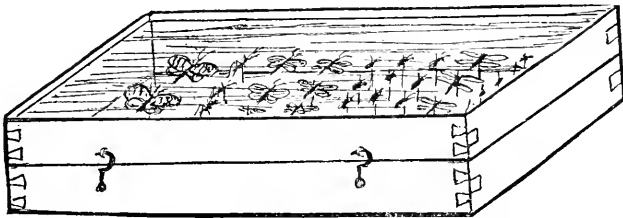


FIG. 5. *Insect box made of wood, with glass top.*

height is three inches outside measure. The upper edge of the sides of the bottom of the box is made with a tongue which fits into a groove made in the lower edge of the sides of the cover. This is done so that the top and bottom parts of the box shall fit very closely together in order that museum pests cannot get in and destroy the specimens.

Fig. 6 shows a cross-section through one side of the box, showing how it should be made and giving measurements. In the drawing the glass is fitted into a groove in the inner side of the cover. This glass might be puttied in like a window pane if it is found difficult to make the groove. The corners of the box may be mitred and dove-tailed or mitred and nailed; the latter is

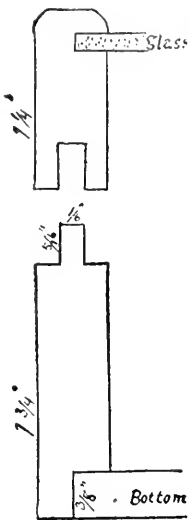


FIG. 6. A cross-section of the side of insect box FIG. 5, showing method of construction and giving measurements.

more easily done. Any carpenter or cabinet maker can make this box; but great care must be taken to use only thoroughly seasoned wood in its construction. Otherwise the bottom will be sure to warp and shrink and leave cracks through which the museum pests will enter.

The cost of such a box will vary from \$0.75 to \$1. Basswood should be used in the construction; pine is not at all suitable on account of the resin in it. Screw eyes may be put into these boxes and they may be hung on the walls of schoolroom like pictures.

MUSEUM PESTS.

These are small beetles which find their way through the narrowest crevice into the insect boxes and lay their eggs on the pinned insects.

The larvæ when they hatch work within the specimens at first but after a time destroy the bodies entirely. The presence of these little rascals may be detected by dust on the bottom of the box just below the infested insect. As soon as this dust is observed, pour into one corner of the box a tablespoonful of carbon bisulphide, or benzine, and close the box quickly. The teacher or parent should put these substances into the boxes as the first is a poison and the latter is very inflammable. As a method of preventing the beetles from attacking the collection it is well to fasten a "moth ball" into one corner of the box. These may be obtained at a drug store.

SPREADING BOARD.—FIG. 7.

Butterflies and moths look much better in a collection when their wings are extended at right angles to the length of the body. To arrange them thus we have to use what is termed a spreading-board.

Materials needed for a medium sized spreading-board.

1. Two strips of pine or other soft wood 18 inches long, $1\frac{1}{2}$ inches wide and $\frac{1}{2}$ inch thick.

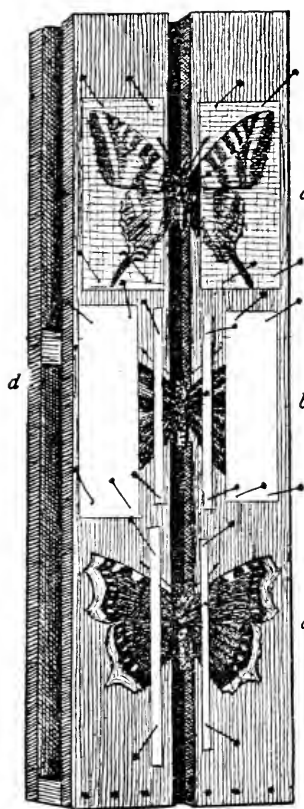


FIG. 7. *A spreading board.*

and this completes it. The space between the two upper boards is wide enough to take in the body of the moth or butterfly. The cork or linoleum below the space will hold firmly the pin on which the butterfly is impaled. The cleats hold the top and bottom boards apart and so protect the points of the pins.

2. One strip of wood 18 inches long, $3\frac{1}{4}$ inches wide and $\frac{1}{2}$ inch thick.

3. Two cleats $3\frac{1}{4}$ inches wide, $\frac{3}{4}$ inch high and $\frac{1}{2}$ inch thick; and two cleats one inch wide and as high and thick as the others.

4. A strip of cork or linoleum 17 inches long and a little less than an inch wide.

To construct the spreading board take the two narrow strips of wood, place them one-fourth inch apart and on the under side fasten them across the ends to the longer cleats. Then on the same side as the cleats tack the piece of cloth or linoleum over the space between the strips of board, and as the cleats are one-half inch wide the linoleum should cover all the space left. Then midway the boards fasten the two smaller cleats. Fig. 8 shows a cross-section of the spreading board just in front of these two middle cleats. Now it is ready for the bottom board which will fit exactly if directions are followed,

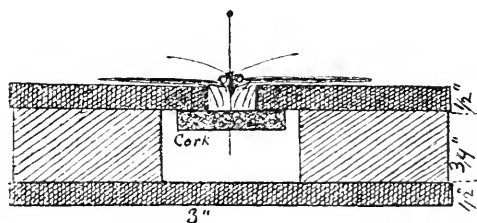


FIG. 8. *A cross section of spreading board in front of the cleat "d" in Fig. 7.*

Spreading boards may be made much smaller or much larger to suit moths of different sizes; the space between the top boards must always be large enough to admit the body of the insect.

To use the spreading board: insert the pin with the butterfly on it into the linoleum just far enough so that the body of insect will be in the space between the boards up to the wings, Fig. 8. Place the wings out flat on the board and fasten them there with narrow strips of paper pinned across them, Fig. 7, *a*. While held down by these strips of paper arrange them so that the hind margins of the front wings shall cover the front margins of the hind wings and shall be in a line at right angles to the body; then pin larger pieces of paper over the rest of the wings, Fig. 7, *b*. Sometimes isinglass is used instead of paper to hold the wings down, Fig. 7, *c*. The insects should be left on the spreading board at least three days; and when the board has insects on it, it should be kept in a box where the museum pests and mice cannot get at it.

Sometimes when the moths are not spread soon after being killed they become so stiff that the wings cannot be moved without breaking them. In such cases the insects should be put on some paper in a jar which has some wet sand in the bottom and which can be covered tightly. The air in such a can is so moist that in two or three days the insect will become limber and may be spread with ease.

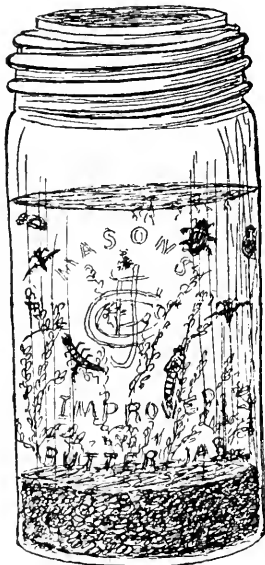


FIG. 9. *An aquarium.*

AN AQUARIUM. FIG. 9.

An aquarium with living, moving insects in it is a very interesting ornament for the window-sill of a school-room. A glass candy jar or even a butter jar may be transformed into such an aquarium thus: first, put into the jar a layer of sand about two inches deep; in this sand plant some small water weeds and then add a layer of gravel or pebbles; then nearly fill the jar with rain water, pouring it in carefully so as not to disturb the plants.

The plants will keep the water in a right condition for the water insects to live in ; more water should be added from time to time to replace that which evaporates. In such an aquarium place any insects found in water and watch their habits.

WHERE TO COLLECT INSECTS.

The border of a piece of woods where many shrubs and weeds are growing is an especially good place for collecting many kinds of insects. Any place where there is a great variety of plants and flowers will give a variety of insects. Banks of streams and underneath stones in the fields are good places for collecting.

WHEN TO COLLECT INSECTS.

The best time of the year is during the summer months. The best times of day is in the forenoon after eight o'clock ; and in the twilight at evening. .

At night many moths may be caught by making a paste of sugar and water (unrefined sugar is best) and painting it upon tree trunks with a brush after sunset. The paste should cover a space two inches wide and several inches long. After dark seek these places cautiously with a lantern and moths will be found sucking the paste : these may be caught with the killing bottle if you move carefully so as not to frighten them ; they do not seem to mind the light of the lantern.

Electric street-lights attract many insects which may be caught in the net. A lamp set in an open window is also a very good lure on warm nights in the spring and summer.

ARRANGING THE INSECTS IN BOXES.

After collecting insects comes the desire to arrange them properly ; putting together in neat rows those that resemble each other. To classify insects correctly requires much study. The scope of this leaflet admits of only a few suggestions about the most common insects.

Dragon Flies.—There are many kinds of these but they all have four wings, finely netted and transparent, the hind wings being as large or larger than the front wings. These are perfectly harmless insects.

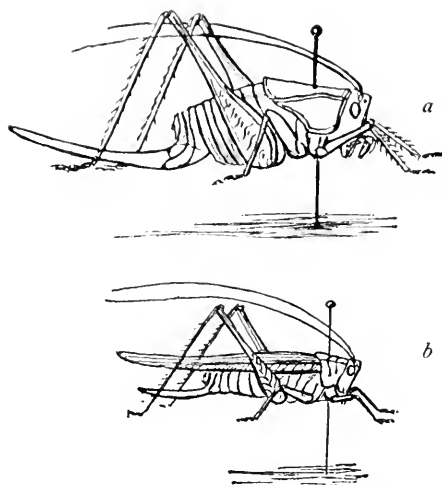


FIG. 10. *a*, Cricket. *b*, Grasshopper.

Bugs.—These insects have the front pair of wings thick and heavy at the base and thin and transparent at the tips, Fig. 11, *b*. The squash bug, the chinch bug, and the electric light bug are examples of these. Some bugs^a have the front wings entirely thin and transparent and sloping like a steep

roof over the back of the insect like the cicada,

Fig. 11, *b*; and the Brownie bug, Fig. 11, *c*, *d*.

Beetles.—These have hard wing-covers which meet in a straight line down the back and have a pair of thin wings folded under them, Fig. 12. The “June bug” or “May beetle” and the potato beetle are good examples of beetles.

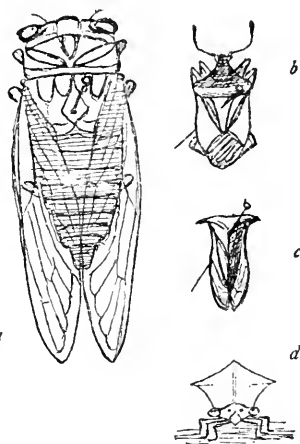


FIG. 11. *a*, Cicada. *b*, Stink-bug. *c*, Leaf-hopper. *d*, Leaf-hopper—front view.

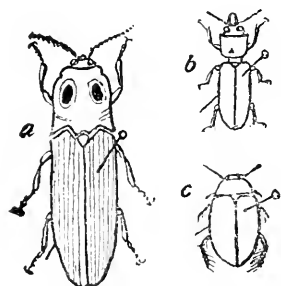


FIG. 12. *Beetles*—showing the pin through the right wing cover. *a*, Snapping beetle. *b*, Wood-boring beetle. *c*, Water beetle.

Flies.—These have only two wings, usually transparent. Behind each of these wings a short thread with a knob on it extends out on each side of the body instead of hind wings, Fig. 13.

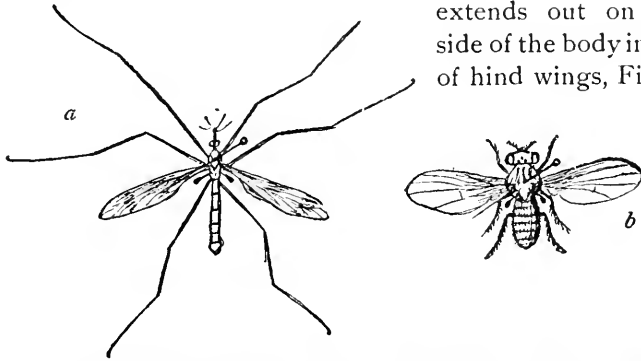


FIG. 13. *Flies*—showing the knobs just below the wings. Note that flies have only two wings. a, Crane fly. b, Pomace fly—enlarged.

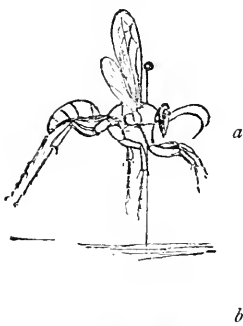


FIG. 14. a, Wasp. b, Bee. Note these have four wings.

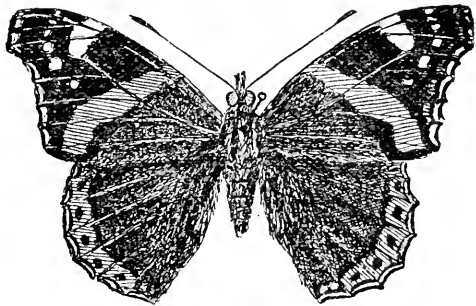


FIG. 15. *The Red Admiral Butterfly.* Note the knobbed antennæ.

House-flies, horse-flies and mosquitoes are examples of flies.

Bees, Wasps and Ants.—Bees, wasps and the winged form of ants have four transparent wings, Fig. 14. Some flies resemble bees and wasps but if examined it will be found that they have only two wings instead of four.

Butterflies and Moths.—Butterflies and moths may be told apart by the following character: The antennæ or horns of the butterflies are always threadlike and knobbed at the tip, Figs. 15, 16, while the antennæ of moths are in various shapes, but never bear knobs at the tips, Figs. 17, 18, 19, 20.

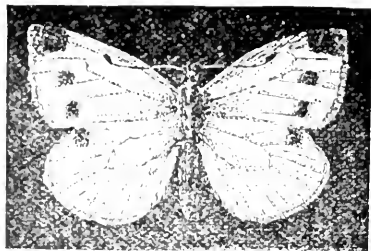


FIG. 16. *The Cabbage Butterfly.*

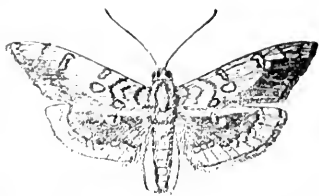


FIG. 17. *The Bass-wood leaf-rotter moth.*

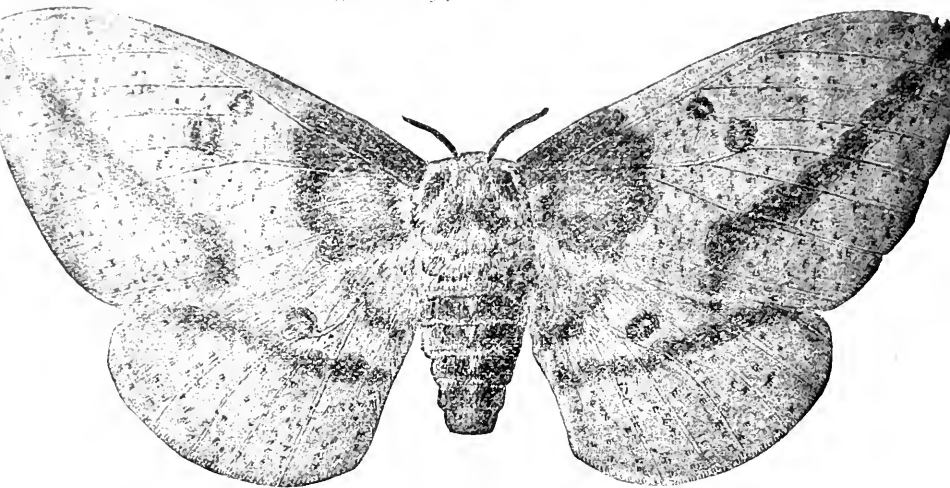


FIG. 18. *The Imperial Moth. A common night-flying moth.*

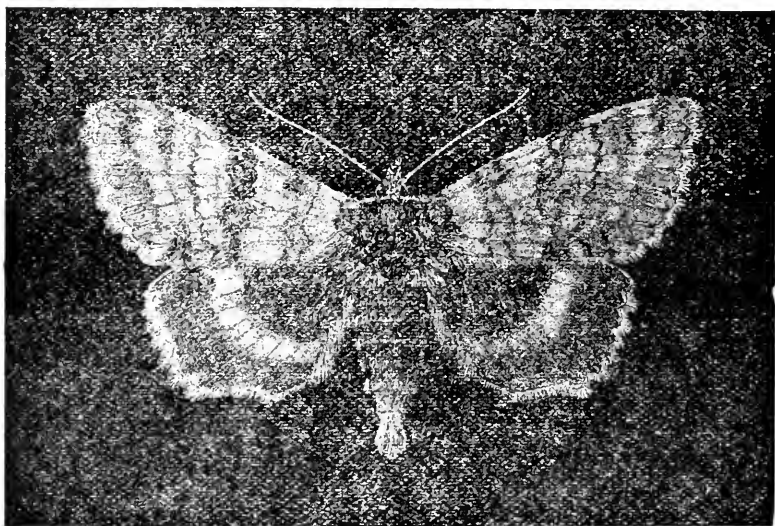


FIG. 19. *An Under-wing Moth.*

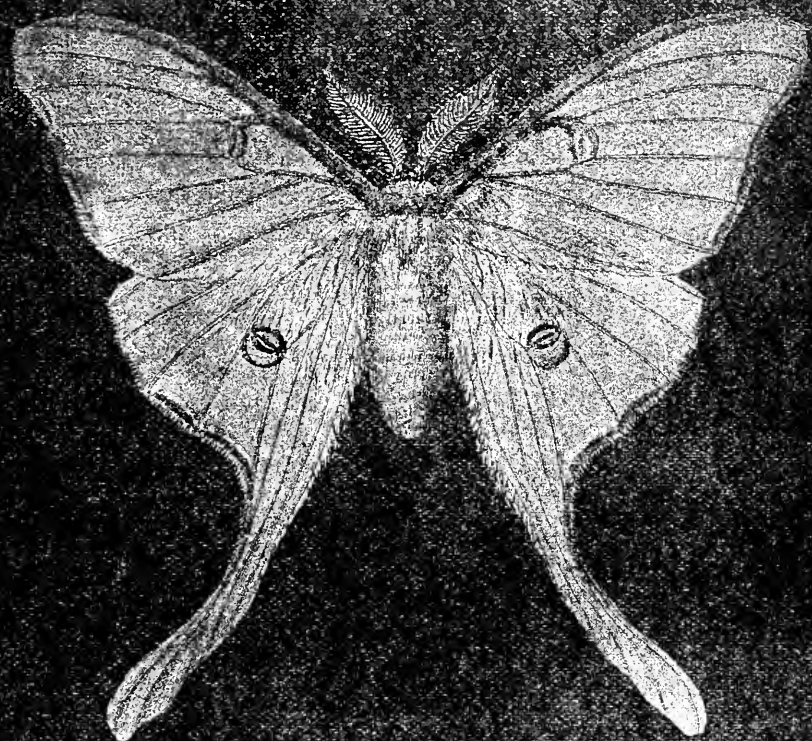


FIG. 20. *The Luna Moth. A common night-flying moth.*

DEALERS IN ENTOMOLOGICAL SUPPLIES.

The following is a list of the dealers in entomological supplies that have advertisements in the current American entomological journals :

A. Smith & Sons, 269 Pearl Street, New York, N. Y.

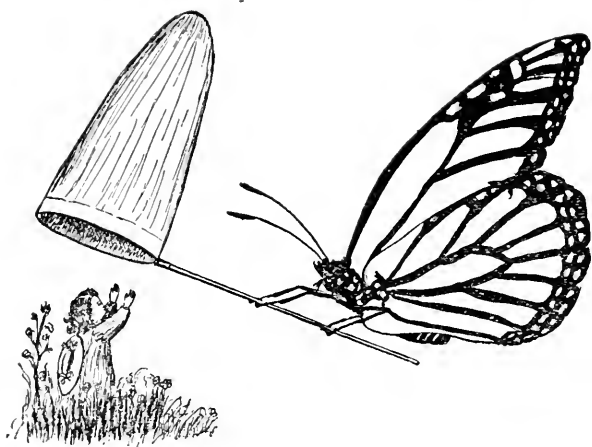
John Akhurst, 78 Ashland Place, Brooklyn, N. Y.

M. Abbott Frazer, 93 Sudbury Street, Boston, Mass.

Entomological Society of Ontario, Victoria Hall, London, Ont.

Queen & Co., 1010 Chestnut Street, Philadelphia, Pa.

The Bausch & Lomb Optical Company, 515-543 N. St. Paul Street,
Rochester, N. Y.



New York Botanical Garden Library



3 5185 00258 3225

